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THE HILLS TELL

A well-known peculiarity of lubricating oil is this:



You will find that with Gargoyle Mobiloil your car will

Chemical or physical tests are often quite misleading.

Two oils of the same gravity may differ in efficiency.

Two oils of the same flash test may be entirely unlike in action.

Oils from widely different bases may be given the same body or viscosity.

Gravity, flash test, body, and viscosity are, therefore, not safe guides to the oil's actual durability or lubricating qualities.

The only real tests of lubricating oil are practical tests.

Hill climbing offers the motorist one good opportunity for practical demonstration. The oil which enables you to climb a hill most easily will be the oil which yields you the greatest horse power.

climb steeper grades on high speed.

If you wish to make a comparative test, pick out a hard hill. See how far up you can go on a high gear with your present oil. Then replace the oil with the correct grade of Gargoyle Mobiloil. Make sure that the operating conditions of your motor are identical in both cases.

The greater distance that Gargoyle Mobiloil will carry you up the hill represents greater actual horse power—resulting from reduced friction and reduced escape of compression and explosion.

You receive this greater efficiency on the level stretches as well as on the hills. It is simply more difficult to measure.

A booklet on lubrication containing our complete chart, which embraces all American makes of cars and the leading foreign makes, will be mailed on request.

The various grades, refined and filtered to remove free carbon, are:

- Gargoyle Mobiloil "A"
- Gargoyle Mobiloil "B"
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A grade for each type of motor

They are put up in 1 and 5 gallon sealed cans, in half barrels and barrels. All are branded with the Gargoyle, which is our mark of manufacture. They can be secured from all reliable garages, automobile supply stores and others who supply lubricants.

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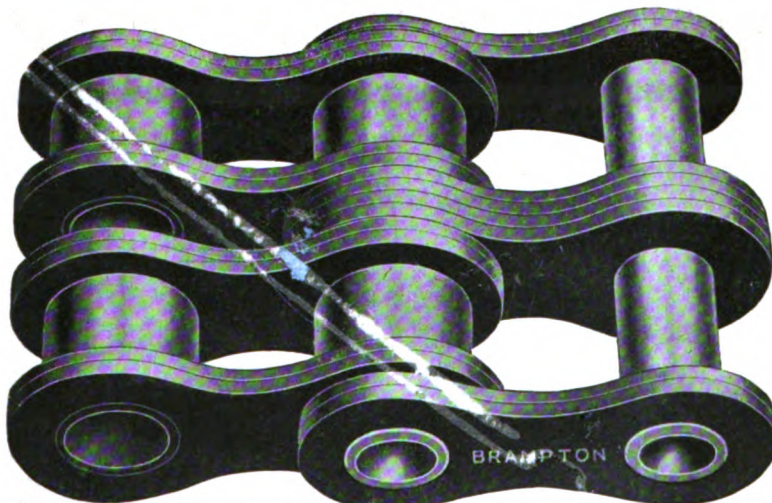
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Valentine's varnishes are the highest grade vehicle varnishes made—that is, the most brilliant, most easily used, and most durable.

Also, they are of necessity the most expensive; by using them the makers show that they pursue the policy of equipping their cars with the best materials, whatever they cost.

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Car owners should ask for Valentine materials when having their cars refinished. Any vehicle painter will use them if specified. Most painters use them regularly.

Write for our book, "The Care of the Car"

VALENTINE & COMPANY
Largest Manufacturers of High-Grade Varnishes in the World
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Ease of handling without slipping or bruising.

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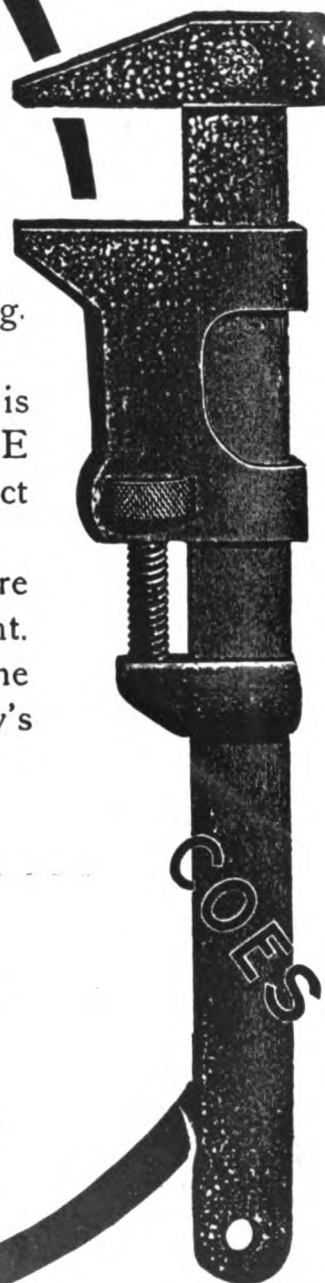
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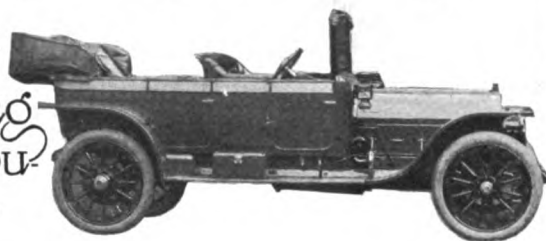
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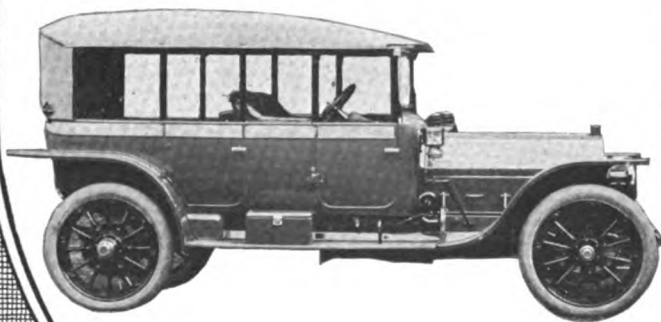
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TALKING of economizers—take our drop forge plant, which, while it is the largest in the business, is only one small part of our equipment.

Here we operate 40 large steam hammers with a combined striking power of 6,880,000 pounds or 3440 tons.

Also there are over a dozen monster presses and ten Ajax forging machines.

Take one example of the economy such equipment can effect: Overland hammers have an attachment whereby the spring-

seat of a front axle is so perfectly formed (by the hammer blow) that it needs no additional machining.

This operation takes but 30 seconds.

In smaller plants the same work by slow, small factory methods, takes from 30 to 40 minutes.

And this is but one of the hundreds of different economies effected by our huge drop forge equipment.

Now do you see why the Overland costs you 30% less than any other similar car made?

Catalogues free on request. Please address Dept. 52.

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SPECIFICATIONS

*Electric head, side,
tail and dash lights
Storage battery*

*35 Horsepower motor
114-inch wheelbase
33x4 Q. D. tires*

*Stewart speedometer
Mohair top, curtains
and boot*

*Clear-vision rain-
vision wind shield
Electric horn*

Manufacturers of the famous Overland Delivery Wagons, Garford and Willys-Utility Trucks. Full information on request

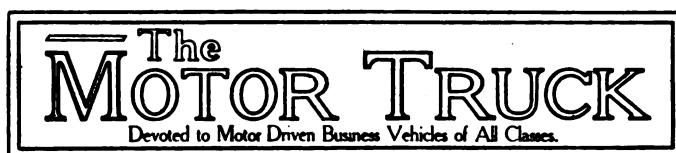
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The National Motor Truck Display

The Only National Showing of Commercial Cars, Accessories, Parts and Equipment held in America.

The success of the 1913 Display marked New England as the one logical section of the country for such a show.

New England is and will continue to be the Best Commercial Vehicle Market in the country. Every condition is favorable for the use of power driven vehicles and the market has not been scratched.



Will issue, MARCH 10, a special Buyers' Reference Number and it will be mailed in time to reach the hands of owners and prospective purchasers just before the show opens. This edition will reach buyers in this field and all selling interests doing business in these states.

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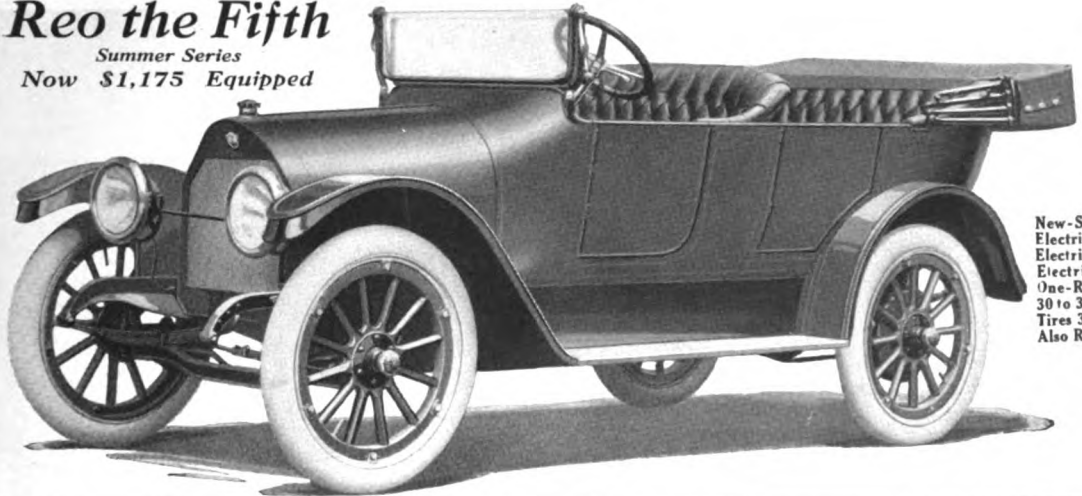
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Reo the Fifth

Summer Series
Now \$1,175 Equipped



New-Style Body
Electric Lights
Electric Starter
Electric Horn
One-Rod Control
30 to 35 h. p.
Tires 34x4
Also Roadster

Reo the Fifth appeals to men who are buying a car to keep. Lesser-built cars may run as well at the start. Even for months they may perform about as well as this.

It is the second season, and afterward, when the difference in cars stands out. Then you will know why Mr. Olds insists on his extremes.

A Long-Time Car

Every part in Reo the Fifth is based on 27 years of experience. Legions of men have put Olds-built cars to every possible strain and test. And no man knows better than Mr. Olds the margins of safety needed.

All steel is made to formula, and each lot is analyzed twice. All driving parts are given 50 per cent. over-capacity.

Gears are tested in a crushing machine for 75,000 pounds per tooth. Springs are tested for 100,000 vibrations. Each engine gets five long-continued tests. Each is run for many hours, then taken apart and inspected.

Reo the Fifth has 15 roller bearings. It has 190 drop forgings where steel castings might have flaws. It is built slowly and carefully, with countless tests and inspections. The close-fitting parts are ground over and over.

The extremes we employ add 20 per cent. to the necessary cost of this car. But the result is a car which, for years and years, continues to run like new. An almost trouble-proof car. A

Almost the Last Word In This Class of Car

The Chassis is the final achievement of Mr. R. E. Olds, the dean of all designers. It embodies all of his costly extremes, his care and skill and caution. It marks the utmost in an honest car.

The New Body—this streamline body—is the coming vogue. Europe has adopted it on all her leading cars. And there, where body styles originate, these flowing lines are considered finality.

The Equipment includes all that motorists desire.

The Price this season drops \$220, for reasons stated below. There is no probability that an equal car can ever be built for less.

So this year's Reo the Fifth, in all respects, approaches the limit for this class of car.

safe, staunch car. A car with small cost of upkeep. Men are coming, more and more, to want a car like this.

Classiness

We give equal attention to comfort and beauty. This streamline body follows the lead of the finest cars of the day. No break at the dash, no projecting hinges. The finish is perfection. All possible parts are enameled. The upholstery is of genuine leather, deep and soft. You will hardly find at any price a more luxurious car.

Equipment

All instruments and

gauges are now flush with the dash, and all within reach of the driver. The car comes equipped with the best electric starter we know. All lights are electric, the searchlights have dimming attachment. There is an electric horn, an extra rim, a speedometer, a new tire carrier on the back which holds the tail light and the number.

The windshield is part of the body. It is rain-vision and ventilating.

Then this car alone has our one-rod control. All the gear shifting is done with one small center rod, set out of the way. It is done by moving this rod only three inches in each of four directions.

No levers, side or center—nothing in the driver's way. Both brakes are operated by foot pedals. You never saw such simple control.

Now \$220 Less.

And this year the price drops to \$1,175, with all this complete equipment. Last year's model sold for \$1,395 with electric starter and lights.

There has been some saving in electric equipment, and a lowered cost for tires. But the main saving comes through confining our output to this single chassis for years. All our cost for machinery, tools and jigs has been charged against previous output. From this time on our factory cost is simply the cost of making.

That was what we aimed at three years ago in adopting this final chassis. We have aimed to save you all that changes cost in machinery and equipment. After three years of enormous output this end has been accomplished. Our machinery cost is all wiped out, and we give you the entire saving.

We have dealers in a thousand towns. Ask us for name of nearest one. Also for new catalog.

Reo Motor Car Company

Lansing, Michigan

Canadian Factory, St. Catharines, Ont.

Canadian Price, \$1,575.

(224)

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Carbon in your cylinders means loss of power. Customers report 10,000 to 15,000 miles with no carbon troubles. A good motto: TRY ANYTHING ONCE. EAGLEINE NO-CARBON AUTO OIL is furnished in 1-5-10 gallon, 30 and 50 gallon Steel Drums with faucets for which no extra charge is made.

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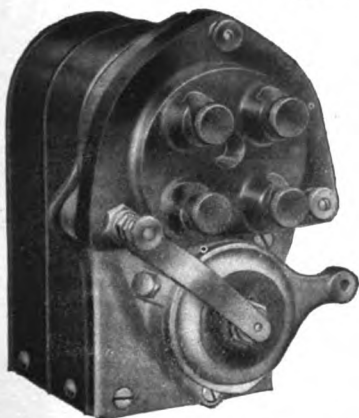
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For Low-Powered High-Speed Engines

there is nothing on the market so effective as the new waterproof, high-tension SPLITDORF "E U 4" MAGNETO. In design and construction it is destined to fill a long felt want in the motoring world as low-powered, high-speed machines can now be equipped with a powerful instrument to give their ignition systems the "kick" they have so sadly needed.

Waterproof and dustproof, the "E U 4" SPLITDORF magneto is made throughout on a principle of strict utility combined with natty appearance and reserve power sufficient for a 30 horsepower motor at high speed.



It is a simple instrument, simple in wiring and easily installed to produce the hottest of hot, fat sparks and guaranteed to give the small high-speed engines a flexible ignition system and a world of reliable "pick-up" power never before attained.

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PUBLISHER'S COMMENT.

The Importance of the Boston Show, the biggest and best of them all, has been recognized in recent years by the manufacturers, who have reserved announcement of their newest models for that display. The pleasure car exhibition will be held in Mechanics' building, March 7-14, to be followed, after a lapse of three days, by the only commercial vehicle display of national prominence scheduled for 1914, March 17-21. In every respect this Boston Automobile Show will be the most important event of its character this year.

The Boston Show Numbers of The Automobile Journal will be issued Feb. 27, advance, and March 12, review. For months the editorial staff has been compiling and preparing detailed information concerning the products of the industry which will be presented in these issues in such manner as to make them invaluable as books of reference throughout the coming season. No owner or prospective owner can afford to be without them. They will be retained and referred to constantly, and the information therein can be relied upon as thoroughly dependable. Make certain that

you shall not miss these buyers' references and guides. Order now—direct, or through your news dealer.

Are You a New Owner?—In each issue of The Automobile Journal is a special department (see page 45), devoted particularly to the interests of the man who has purchased his first car. The suggestions contained therein will be found of exceptional value to the novice who desires to secure the utmost in efficiency and economy from his machine. The subjects are treated in simple, non-technical language and are selected with a view to meeting the needs of the greatest number. The Correspondence Department (see page 53) also is available to new owners who may have special problems concerning which they desire advice or assistance. The service is free.

Particular Attention is drawn to the New Accessory Department on page 35, in which are described and illustrated the latest supplies, parts and fittings as soon as they are placed upon the market. Manufacturers are invited to co-operate with the editorial department in making this feature of utmost practical benefit to all.

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You don't chance it when you use Bosch Plugs, because Bosch Plugs are made to be reliable, always.

Be Satisfied. When You Buy Plugs, Buy Bosch Plugs.

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"Locating the Spark Plug" tells you all you ought to know about plugs—write for a copy, it's free.

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Detroit**

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**San Francisco
Toronto**

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Boston Automobile Show**
**THE
BIG SHOW NUMBERS**
—OF—

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AUTOMOBILE
JOURNAL**

**The Show and the Show
Numbers of the Year....**

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Feb. 28 EDITIONS March 10**

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AUTO SHOW**

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The richest section of the country. Better business. The display marks the opening of the active selling season in these states.

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Show issues reach readers just before the opening of the show and directly following it. A distribution of 25,000 copies for these editions. A positive guarantee to reach every trade interest doing business in these sections.

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TWELFTH ANNUAL AUTO SHOW

Mechanics' Building, Boston

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Second Section

Motor Trucks

AUSPICES

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March 17th to 21st

**Opens Tuesday Evening, March 17, at 8.
Thereafter 10 A. M. to 10:30 P. M.**

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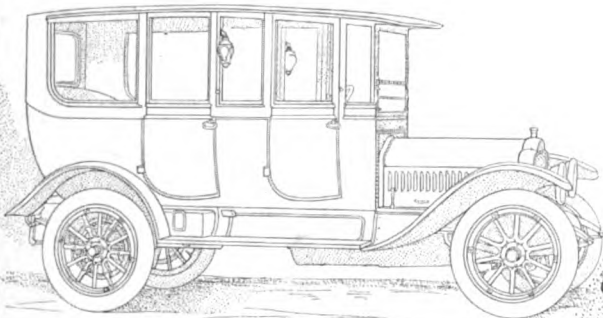
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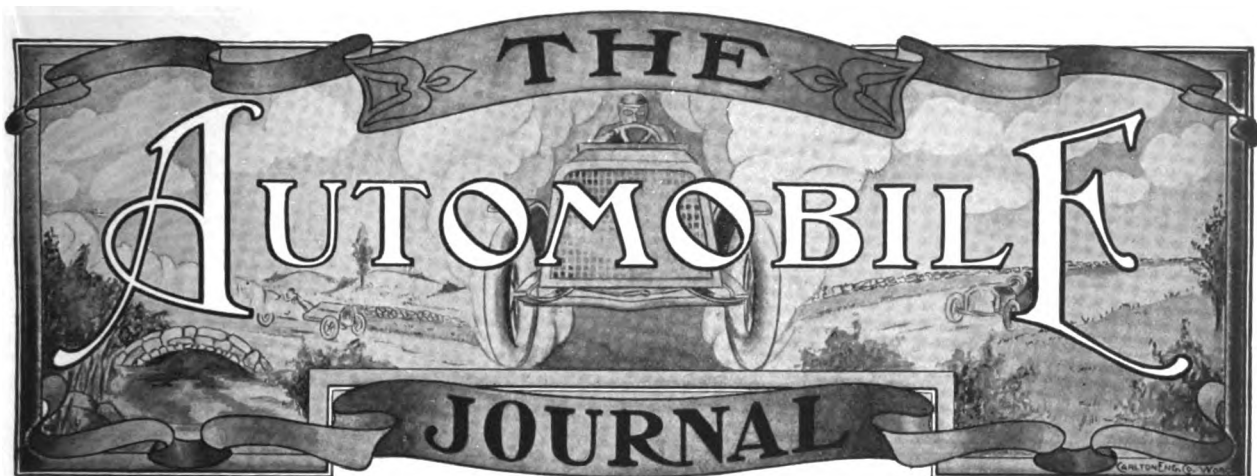


Venus persuades Apollo to abandon his sun chariot for the White Berline.



- Otto Cushing

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TRAFFIC CONDITIONS IN LONDON.

How the Gradual Adoption of Motor Vehicles Has Diverted Traffic from the Railroads to the Streets—Steps That Are Being Taken to Prevent Congestion at Certain Danger Points—Effect Upon Regulation Elsewhere.

WHILE it is a matter of general knowledge that the necessity for traffic regulation has been extended even to the smaller cities of the United States during the past

few years, the reasons for this are, perhaps, not so well understood. The present tendency toward congestion is the result of conditions which did not exist prior to the advent of self-propelled road vehicles, but this statement does not disclose

the entire facts, as will be shown herein. Traffic conditions are most acute in the largest cities—New York and London, for example.

It was in such centres that attention was first directed to the necessity for regulating the use of streets. Herewith are presented two illustrations, which indicate the conditions existing in

the two cities named. One of the views was taken on Regent street, London, and the other at the corner of 41st street and Fifth avenue, New York City.

Because of its position as the largest city in the world, it is not surprising to learn that a consideration



Section of Regent Street, London, England, Indicating Character of Traffic and Method of Handling It.

of this problem was undertaken in London before conditions reached a point in New York, where similar regulation was deemed advisable.

And it may be added that traffic regulation was in vogue in both cities long before the practicability of the automobile was regarded as established.

In studying the illustration it must be borne in mind that in Great Britain, the rule of the road demands that traffic keep to the left, which is exactly the opposite of that which applies in this country. For a number of years it has been found necessary to require that the slow moving vehicles keep next to the curb, permitting the faster traffic to form a moving line nearer the



Traffic on Fifth Avenue, New York City, Between 41st and 43rd Streets.

centre of the street. To some extent this is the plan which police officials have sought to enforce in this country.

Before the advent of automobiles in London, the number of vehicles had increased to a point where it was considered absolutely necessary to adopt this precaution, and it has since been found desirable to designate many streets as one-way thoroughfares, providing four lines of traffic, one for slow moving horse vehicles, one for fast moving horse vehicles, a third for motor trucks and business wagons, and the fourth for the faster moving automobiles. So far as is known no

American city has a similar requirement, although Philadelphia is readily cited as a city having a large number of one-way streets.

Factors of Safety and Efficiency.

But conditions in London have received rather more attention than those in any American city. The London Board of Trade has established a traffic branch which has devoted a large proportion of its time during the past six years to a careful and systematic study of the problem. Traffic regulation is looked upon not only as a safeguard to pedestrians and passengers, but as an efficiency measure, since the lack of congestion has a monetary value to the commercial world.

This traffic branch has taken an annual census each year during the last six, and in addition has accumulated a fund of information covering the whole matter. In connection with the census report for 1913, it is stated that it is safe to assume that 250,000,000 journeys were made during that year on the trunk railway lines within the Metropolis. The local railway companies supply figures which necessitate the addition of 436,492,548 more. The tramways and omnibuses can account for 1,349,109,979. The information takes into consideration only passenger carrying vehicles of a quasi-public character, and shows that practically 60 per cent. of such traffic is by road. Of course, it is impossible to secure such information regarding the number of journeys made by private vehicles, or those made by freight wagons and trucks.

The number of passenger journeys made by road in metropolitan London has almost doubled within the last decade, and the increase in population and the growth of trade have brought, at least, a corresponding increase in the use of the streets by postoffice and railway vans, and by the freight and express handlers generally. In spite of all this additional traffic, however, the road system, with the exception of local additions and improvements, is practically identical with that of a century ago—more especially with reference to the main roads radiating out of London. This statement also would hold true of many other cities, both in this country and abroad.

Effect of Motor Vehicles.

It is conceded in London that it is largely due to the introduction of the more rapidly moving mechanically propelled vehicle that it has been possible for this increased traffic to pass through the streets in their present condition. In other words, even with the normal increase of traffic, it would have been more difficult to avoid conges-

tion had not this increase been of a character of vehicles which helped to solve the problem. This, also, undoubtedly applies to other cities.

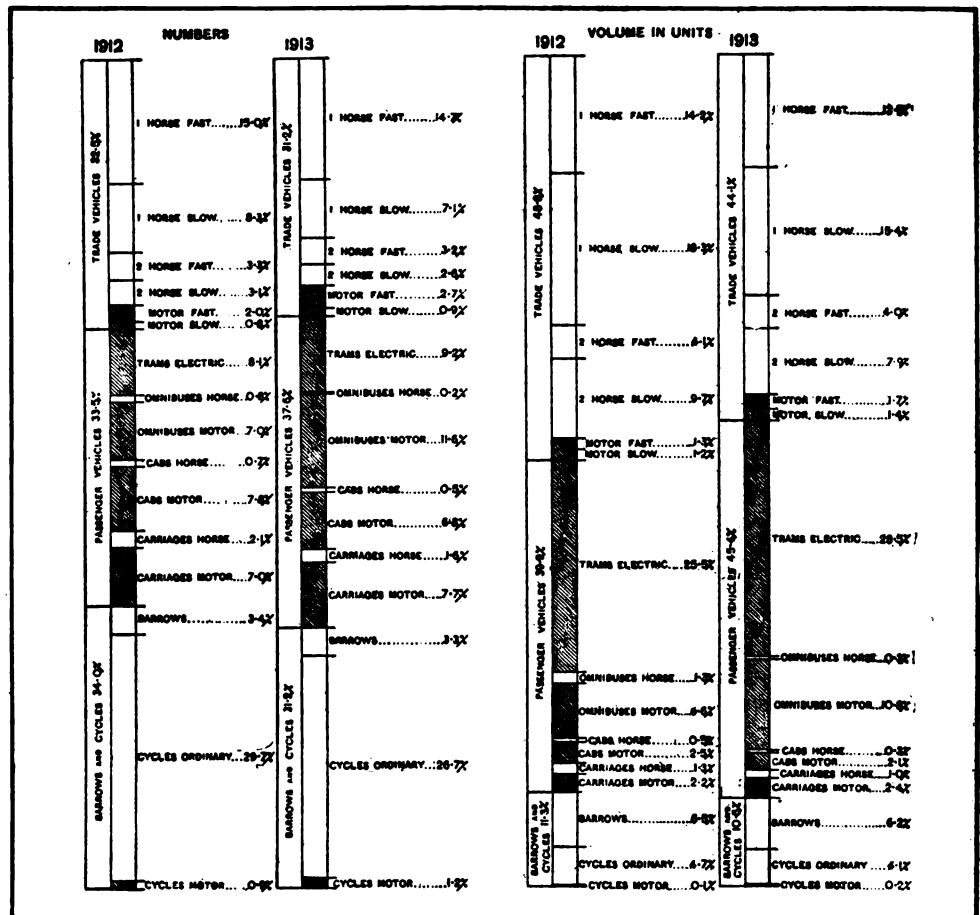
But while the introduction of motor vehicles in London has had a tendency to prevent congestion, on the one hand, it has been the means of adding to the possibilities in this direction, on the other, from the fact that there has been a gradual withdrawal of a large amount of traffic from the railways to the roads, as the economy of this type of transportation has been appreciated. Ninety-four per cent. of the passenger vehicles met in London are motor propelled. As yet, only 12 per cent. of the so-called trade vehicles are of this type, but there is a general consensus of opinion as to their practicability and utility, and a gradual extension of their adoption to the exclusion of the horse drawn vehicle is regarded as well assured in all directions.

The data obtained by the investigations of this branch of the London Board of Trade have established facts that will have application in other centres, and will help to explain the necessity for traffic regulation even in the smaller cities in this country. The results also will have a bearing upon future consideration of the problem. Commissions are now at work upon the development of uniform regulations, based upon the systems in vogue in London and elsewhere, which may be adopted generally.

The report accompanying the latest traffic census taken in London is full of interest as setting forth the facts determined. The story is told in the accompanying diagram, which presents a comparison between the census of 1912 and that of 1913, and shows the gradual increase

in the number and volume of motor driven vehicles.

Among the results attained is the determination of many points at which congestion is likely to occur, and where this liability is becoming more accentuated each year. At present, the traffic branch is at work upon a scheme for diverting traffic from these danger points. The report and its accompanying charts, with other information respecting congestion centres, etc., will be laid before the London city councils, in an effort to still further solve the problem of diverting



Results of 1912 and 1913 Census Presented Diagrammatically to Show Relative Increase in Various Types of Vehicles.

the large volume of traffic through the streets in the interests of safety and efficiency.

Jan. 24, fire seriously damaged about 100 imported chassis, for which Moore & Munger of 602 West 52nd street, New York City, was constructing special bodies. This concern is one of the best known body designers and builders in this country, and a large proportion of its business is for owners of imported chassis.

NEW MODELS REVEALED AT CHICAGO.

**Herff-Brooks Company Provides a Surprise with Four and Six-Cylinder Chassis—
Two Non-Poppet Valve Motors Also Make Their Initial Appearance.**

AS WAS expected, several makers of cars and accessories awaited the opening of the Chicago national automobile show before announcing their new models. Of the nine producers of gasoline machines who followed this plan, one was entirely new—or two, if the newly formed Lexington-Howard Company be counted, although the names of the cars manufactured by this concern already were well known. There also were eight makes of electric cars which were not seen in New York, and a number of acces-

poses heretofore. The decorative treatment was such as to represent a conservatory setting, and accompanying illustrations give some idea of the elaborate effect which resulted. This applied to the ground floor of the Coliseum and the armory, while the remainder of the decorations were in harmony with the general scheme.

In attendance and business transacted, the Chicago show set an entirely new record. From the opening night, when the attendance was 15 per cent. larger than at any previous display, the crowds filled the buildings afternoon and evening. There was abundant evidence that the people of the Middle West were quite as much interested in automobiles as those of other sections in which displays have been held since Jan. 1.

New Gasoline Cars.

The one make of gasoline machine which was entirely new was the Herff-Brooks, exhibited by the Herff-Brooks Corporation, Indianapolis, Ind. This was a genuine surprise, for, although the name of this concern appeared on the advance list of exhibitors, it was well known that it was organized to take over the sale of Marathon cars, made by the Marathon Motor Works, Nashville, Tenn. The product of this latter concern also was shown,

and for the first time at a national exhibition this year.

The Herff-Brooks car is produced in two models, a six and a four, each chassis being supplied with either a two-passenger roadster or five-passenger touring body. The motors are the same in general design, the six having bore of four inches and stroke of 4.5, and the four, 4.125-inch bore and five-inch stroke. Both are of the L head type, the four being cast en bloc and the six singly. The clutch is a cone, and the trans-



Looking Down the Main Aisle in the Coliseum, Chicago, Indicating the Elaborate Appearance of the Conservatory Setting.

sories, parts and fittings, including two new non-poppet valve motors. No reference is made to the cyclecar division at this time, this subject being treated elsewhere in this issue.

Just before the opening of the show, which was held Jan. 24-31, it was found necessary to add still another building, the original announcement including the Coliseum, Coliseum Annex and First Regiment armory. The fourth structure was the Greer building, formerly the Wilson, which has been utilized for overflow pur-

mission affords three forward speeds and reverse. The driver is placed at the right, with central control levers.

The other makes which were not seen at New York were the following: Crow Elk-Hart, Crow Motor Car Company, Elkhart, Ind.; Lambert, Buckeye Manufacturing Company, Anderson, Ind.; Westcott, Westcott Motor Car Company, Richmond, Ind.; Pilot, Pilot Motor Sales Company, Richmond, Ind.; McFarlan, McFarlan Motor Car Company, Connersville, Ind., and the Lexington and Howard. None of these is strictly new, except for refinements in design and construction, practically all of which have been announced from time to time in these columns. However, it is worthy of special mention that the McFarlan is fitted with the Gray pneumatic gear shift, the first car to be thus equipped.

New Electric Cars.

The term new is applied to the electric vehicles shown at Chicago solely to distinguish them from the makes seen at New York. As a matter of fact there were no new makes revealed, although the following are to be designated as above: Argo, Broc and Borland, American Electric Car Company; Century, Century Electric Car Company; Chicago, Chicago Electric Car Company; Standard, Standard Electric Car Company; Columbus, New Columbus Buggy Company, and Woods, Woods Electric Vehicle Company. The Borland, Century, Chicago and Woods are made in Chicago; the Broc in Cleveland, O.; the Columbus, in Columbus, O.; Argo in Saginaw, Mich., and the Standard in Detroit.

As with the gasoline models, the changes in design have been presented in these columns, with but one exception, that being the new Columbus colonial brougham, model 1235. This car has a high speed motor driving through a single reduction by means of worm gearing. It carries a 40-cell battery of the 17 lead plate no-wash type. Steering is by means of a side lever, while control is also by horizontal lever above the steering handle. The front seats are of the revolving chair type.

It might also be mentioned that one of the Chicago electrics displayed was a special design built for presentation to Pope Pius X, by a number of Chicago people. It was of the regular models, No. 143, and was distinguished from other cars of this type by the use of the papal coat of arms, embossed in red, on the door panels, and by the special upholstery, also bearing the papal coat of arms.

Non-Poppet Valve Motors.

No new cars fitted with non-poppet valve motors were brought out at Chicago, but two entirely new engines of this type were displayed. One of these, the Charter, invented by J. A. Charter and made by the Charter Single-Sleeve



One of the Side Aisles in the Colliseum Show, Chicago, Presenting Another Detail of the Handsome Decorative Scheme.

Motor Company, Chicago, employs a rotating sleeve valve. The other, the Shaw, made by the Shaw Motor Company, also of Chicago, has a single rotary valve in the cylinder head.

The Charter was shown as a six-cylinder unit. Although described as a single sleeve valve engine, there are in reality two sleeves, one fixed and the other rotating. The fixed sleeve is positioned inside the regulation cylinder casting, next to the piston, and the rotating member is caused to make one revolution between the fixed sleeve and the cylinder walls to every four of the crankshaft. The rotating movement is communicated to the sleeve by a spiral pinion carried on a longi-

tudinal shaft paralleling the crankshaft and driven therefrom.

The fixed sleeve is inserted within the cylinder casting from the top and is anchored thereto by four studs. The top of the sleeve, which is water jacketed, forms the top of the combustion chamber and carries the spark plug. On the sides, suitably positioned, are two openings or ports, one of which serves as the inlet and the other as the exhaust. The rotating sleeve also has two openings, 180 degrees apart, and each of these serves for intake and exhaust purposes. Since the rotating sleeve moves at one-quarter crankshaft speed, one opening uncovers, first the exhaust and then the intake, during one cycle, and the other opening during the succeeding cycle. It would be possible to utilize but one opening in the outer sleeve by arranging to have the sleeve travel at one-half crankshaft speed, but the present method is held to simplify the matter of lubrication.

The Shaw motor was presented as an eight-cylinder unit. The single rotary valve runs along the top of the cylinder casting and is driven from the front by silent chain, completely enclosed in an aluminum casing. The same port is utilized both for intake and exhaust. It is claimed by the designer that the construction makes for a high speed motor, although it may be throttled down to meet any road condition.

The Accessory List.

While there was a large number of accessories, parts and fittings which were not shown in New York, there were few that were entirely new, in the sense that they had never been announced. Readers of The Automobile Journal are familiar with the construction of all devices presented with the possible exception of the Hofbecker-Evans speedlock; the automatic tire rest or motor car jack, made by the Automatic Tire Rest Company, Kansas City, Mo., and the Challon headlight dimmer.

The speedlock consists of a movable disc with a series of figures corresponding to the speed indicator dial on the speedometer. This disc is attached to the top of the speedometer and is controlled by a Yale key. The owner may set the disc at a given figure, and when the speed of the machine has reached that point the ignition is cut off. It is produced by the Hoffecker Company, Boston, Mass.

The tire rest is a jacking device designed to raise the entire car from the floor, the operation being accomplished automatically by driving the car over the jack until the front axle, coming in contact with a coil spring bumper, carries the

rack forward and raises all four wheels from the floor.

The Challon headlight dimmer was exhibited by the Henes Sales Corporation, 179 Washington street, Chicago. It consists of an aluminum disc of less diameter than that of the reflector, so that when it is brought into position in front of the burner, it permits light to pass only around its edges.

SUCCESSFUL TROY EXHIBITION.

Dealers in Three New York Cities Unite in Displaying the Season's Models.

In every respect the fourth annual automobile show held in the state armory at Troy, N. Y., Feb. 2-7, was the largest and best yet seen in that city. As in former years, the dealers in Troy, Albany and Schenectady combined to make the event a success, although it was under the direct auspices of the Troy Automobile Dealers' Association, with Frank M. Baucus as manager, assisted by the officers of the association, as follows: President, Harold G. Hartwell; vice president, Myron J. Adams; secretary, Jesse B. Wilbur, and treasurer, William H. Dennin.

Pleasure cars and trucks were exhibited on the main floor, and accessories in the basement. The general color scheme was tan and turquoise blue, and the bunting thus utilized was partially hidden by a generous use of southern smilax. The list of exhibitors included the following:

Pleasure Cars—Troy Motor Company, Cadillac, Flat; Troy Automobile Exchange, Pierce-Arrow; Bolton-Meyers Auto Truck Company, Haynes; John J. O'Haire, Pilot; Scott D. Nichols, Ford, Reo; Paige-Detroit, Paige; William L. Schupp & Sons, Oakland; Close Bros., Knox; S. B. Ketchum Company, Buick; Franklin Motor Car Company, Franklin; Illum Garage, Maxwell; E. V. Stratton Company, Hudson; Schenectady Welding & Repair Shop, King; L. R. Mack, Packard; Albany Garage Company, Chalmers, Peerless, Simplex, White; George H. Snyder, Stearns-Knight; Wilbur Auto Sales Company, Kissel-Kar, Regal; Payne Automobile Company, Studebaker; Troy Carriage Works, Rauch & Lang electric, Speedwell, K-R-I-T, Case; C. H. Abbott, Overland, Stanley steam; Alrd Motor Company, Stutz, Premier, Apperson, Marmon; Monument Square Garage, Hupmobile, Stevens-Duryea; Herreshoff Motor Sales Company, Herreshoff; Moyer Motor Sales Company, Moyer.

Commercial Vehicles—Troy Automobile Exchange, Pierce-Arrow, Lippard-Stewart; Scott D. Nichols, Reo; William L. Schupp & Sons, Federal; Close Bros., Knox fire apparatus; L. R. Mack, Packard; Albany Garage Company, White; George H. Snyder, Mack, Saurer; Wilbur Auto Sales Company, Kissel-Kar; Payne Automobile Company, Studebaker; C. H. Abbott, Willys Utility.

Accessories—Standard Oil Company of New York, oils; Rensselaer Vulcanizing Works, tires, vulcanizers; Troy Spring Works, springs; J. H. Warren & Co., general line; Charles H. Turner Company, general line; Motor Car Service Works, welding; Post & Lester Company, general line; Cox Brass Manufacturing Company, welding, carbon remover, windshields, starters; Hindsdill Electric Company, electric supplies; Albany Hardware & Iron Company, general line; Alrd Motor Company, welding; Newman E. McHaffy, repair kits.

MANY NEW CARS FOR BOSTON SHOW.

FOR a number of years the annual Boston automobile show, under the direction of Chester I. Campbell, has been recognized in the industry as the biggest and best motor car exhibition of the year. In number of cars on display, in attendance, and in volume and value of sales, it has for several years exceeded that of any other automobile show in the world. It is not surprising, therefore, that the ability of Mr. Campbell as an organizer of successful exhibitions should have extended to other fields.

In the midst of his preparation for the 1914 Boston automobile show, Mr. Campbell recently received a cablegram from the Countess of Aberdeen, Vice Regal Lodge, Dublin, who is president of the Irish Housing & Town Planning Association, urging him to take the management of the civic exhibition to be held in that city during the coming summer and autumn. He replied that he would consider the offer, but would await complete details before announcing his decision.

Two Shows in One.

Concerning the 1914 Boston show: Let it be stated that this really will be held in two sections—Boston being the only city of national prominence which will stage a truck display this year. The pleasure car exhibit will be held in Mechanics' building, under the auspices of the Boston Automobile Dealers' Association, March 7-14. The display of motor trucks and business wagons will follow, in the same building, after a lapse of three days, under the auspices of the Boston Commercial Motor Vehicle Association, March 17-21.

In canvassing the number of vehicles produced in America, and making comparison with those of the last few years, it is found that several concerns which have been represented at previous Boston shows have either gone out of business or have been combined with other companies and the names of the cars have been dropped. Despite this condition, there is every indication that the number of different makes which will be seen this year at Boston will exceed that of any previous show.

Many New Cars Expected.

Already, with practically a month remaining in which entries may be made, over 80 different makes of cars have been listed, and this number does not take into consideration the cyclecars, of whatever class, under the definitions of the Cyclecar Manufacturers' National Association. This number exceeds that of any other year at this time, and it always has been true that sev-

eral machines are entered at the last moment.

The importance of the Boston show has prompted manufacturers to await its opening before making announcement of the latest models. This feature has been particularly true during the past two years, several so-called 1913 models being shown at the 1912 display, and an even larger number of 1914 models at the 1913 exhibit. There is much reason to believe that this practise will be followed more extensively this year, and the present list indicates that there will be on view many cars which have not been exhibited in New England before.

Cyclecars and Accessories.

Of course, this will prove the first real opportunity to study the various cyclecar models in a

show of this character in New England, because the entire cyclecar end of the industry in America has had its inception and growth since the close of the 1913 show season. The accessory department also will be larger than ever before, because, since the Motor & Accessory Manufacturers decided not to make display this year,

the space occupied by members of this association heretofore has been made available to jobbers handling many lines, and therefore the list of individual accessories, parts and fittings has been extended very perceptibly.

The fact that the pleasure car show is to be held first has temporarily overshadowed the importance of the truck display, but Manager Campbell and a staff of special assistants are working on the plans for this exhibit at the same time as the other. Because it will be the only commercial vehicle show of national prominence this year, and because of the importance of New England as a market for motor vehicles of this type, this division of the Boston show will be quite as large as that which will precede it.



Chester I. Campbell, Manager, Boston Automobile Shows.

ROCHESTER SHOW SETS NEW RECORD.

TWO hundred and one automobiles, counting cyclecars; 36 motorcycles, and an equally representative number of accessories, supplies and fittings helped to make up the \$750,000 exhibit, officially termed the sixth annual automobile show of the Rochester Automobile Dealers' Association, in buildings 3, 4 and 5, Exposition park, Rochester, N. Y., Jan. 24-31.

The attendance exceeded all previous records after Thursday evening, a statement intended to mean that those who visited the display Friday and Saturday were over and above all who attended any previous exhibition in that city. The coveted honor of securing the first sale was taken by Thomas J. Northway, who made the sale during the first hour, and there-

Pleasure Cars—F. Porschet, Apperson; Electric Car Sales & Service Company, Broc electric; C. L. Whiting, Buick, Fiat; Mabbett-Bettys Motor Car Company, Cadillac; A. Elliott, Cartercar, Partin-Palmer; Plymouth Garage, Case; Mandery Motor Car Company, Chalmers, Packard, Ohio electric, Standard electric; Strong-Crittenden Company, Chandler, Lozier, Paige; Arthur McNall, Chevrolet, Peerless, Rauch & Lang electric; Shafer-Decker Company, Cole; G. W. Henner, Crow Elk-Hart, Metz, Oldsmobile; F. R. Luescher, Inc., Jeffery, Reo; Jas. Cunningham, Son & Co., Cunningham; Curtis-Pembroke Company, Davis, Winton; Charles E. Sager, Detroit electric; Thomas J. Northway, Ford; Franklin Motor Car Company, Franklin; A. M. Zimbrick, Haynes, Lyons-Knight, Maxwell, Premier; W. M. Klipp, Henderson, Stutz; C. C. Bateman, King; Ball-Washburn Motor Company, KisselKar, Simplex, Vulcan; McKenney & Gilpin, Crescent, K-R-I-T, Oakland; Empire State General Vehicle Company, Locomobile; Paul LeHardy, Marmon; Carthage Auto Company, McFarlan; C. E. Hartson, Hupmobile, National; Overland-Rochester Company, Overland; Almy Auto Company, Palmer-Singer, Pilot; C. F. Oatway, Paterson; Robert Thomson, Pierce-Arrow; A. V. Hart, Regal; John Cunningham-Fordham Company, Speedwell; E. W. Fisher, Stearns-Knight; Peck & Arnold, Stude-



Visitors at the Rochester Show Entered the Exhibit Through Building No. 3, Where Accessories Were Displayed.

after the selling was brisk until the close of the show.

The accompanying illustrations, which present a view in each of the three buildings, indicate the character of the decorations. The same plan was followed, as last year, of causing visitors to enter the show through building No. 3, where the accessory booths were located, and exit after passing through buildings 4 and 5.

The event was under the personal direction of C. A. Simons, as manager, assisted by the following committee: President F. W. Peck, Secretary G. J. Bauer, C. E. Hartson, F. R. Luescher, W. C. Barry, Jr., Paul LeHardy, A. R. McKenney, A. V. Hart, Arthur McNall, C. E. Sager, H. G. Strong and A. M. Zimbrick. The list of exhibitors included the following:

baker; Frank P. Hunt, Velle; Genesee Motor Vehicle Company, Wahl; John Leader & Son Company, Woods electric.

Commercial Vehicles—C. L. Whiting, Buick; Ball-Washburn Motor Company, Chase, KisselKar; F. Porschet, Cleveland, Indiana; John Cunningham-Fordham Company, Federal, Speedwell; Overland-Rochester Company, Garford, Willys Utility; Auto Commercial Company, Horner; G. W. Henner, I. H. C.; Shafer-Decker Company, Kelly; Fitzhugh Electric Garage, L. S. G. electric; Lippard-Stewart Motor Car Company, Lippard-Stewart; W. E. Davidson, Menominee; Mandery Motor Car Company, Packard, Selden, Stewart; C. E. & H. B. Clark Auto Company, Palmer-Moore; Robert Thomson, Pierce-Arrow; W. Ingelow, Service; Sullivan Motor Car Company, Sullivan; Frank P. Hunt, Velle; Vulcan Sales & Service Company, Vulcan.

Cyclecars—E. W. Fisher, LaVigne; W. M. Klipp, Merz. **Motorcycles**—Neff & Malone, Flying Merkel, DeLuxe; Maerchrin, Bloss & Co., Eagle, Henderson, Pope; Ward H. Fisher, Harley-Davidson; E. W. Fisher, R-S; Flynn Bros., Thor; John Kimpson, Yale.

Miscellaneous—A. H. Gabel Company, tops, etc.; Edward Rabe, bodies, tops, fenders; Clifford Company, shock absorbers, tires, rims; Fitzhugh Electric Garage, batteries; Louis Ernst & Sons, Mossberg socket wrenches, Multibestos brake lining, etc.; Rutherford Rubber Company, tires; F. H. Williams & Son, lamps, drip pans, ra-



General View of the Pleasure Car Exhibit in Building No. 4, Rochester.

diators; Rochester Railway & Lighting Company, hydrometers, garage heaters, rectifiers, starters; A. Faber & Co., Golde patent top; E. Q. Williams, ignition devices; Mapes & Burns Manufacturing Company, vulcanizers; Rochester Welding Works, welding outfits; Allen Street Oil Company, Monogram oils; Union Oil Works, oils and pumps; Rochester Rubber Company, supplies; Wagner Dolph Company, side cars; George L. Miner Company, general line.

MANY SALES IN ST. JOSEPH.

Prospects Are Bright for Good Business in District Served by Local Dealers.

The annual show of the automobile dealers in St. Joseph, Mo., was held in the Auditorium, Feb. 4-7, pleasure cars being displayed on the main floor, trucks in the east lobby, and accessories in the right. The city is located in the centre of the wealthiest and most prosperous sections of northwestern Missouri, northeastern Kansas and southeastern Nebraska, and the railroad facilities are such as to make it a large distributing point. The prospect for sales during the coming season is very bright, and this was reflected both by the attendance and sales for the week.

The color scheme was white and green, southern smilax being utilized freely throughout the building. The main floor was arranged to carry out a pergola effect, and the entire interior was illuminated by some

15,000 electric bulbs. Attention was directed to the show each day, by means of a street parade, this being a novelty which worked out with decided satisfaction. The event was under the management of the St. Joseph Automobile Show Association, with the following officers: President, R. R. Calkins; vice president, H. Stubbs; secretary, H. J. Leslie; treasurer, Walter S. McLucas. The following cars were shown:

Overland, Studebaker, Ford, Cadillac, KisselKar, Mitchell, Chandler, Reo, Velie, Buick, Hudson, Stevens-Duryea, Maxwell, Cole, K-R-I-T, Paige, Crescent, Packard, Chalmers, Grant, Premier, Regal, King, Monarch, Dorris, Oakland, Henderson, Enger, Imp cyclecar, Trumbull cyclecar.

According to information from Peru, Ind., E. A. Myers, general manager of the Model Gas Engine Works of that city, is heading a syndicate which has secured control of the Great Western Automobile Company, also of Peru. Milton Kraus, who has been president of the latter concern since the resignation of E. Mack Morris, is said to have withdrawn from the company, and Mr. Myers is to become general manager. The two concerns are understood to have been closely connected, although entirely distinct.



Exhibit of Cars and Decorative Scheme in Building No. 5, Rochester.

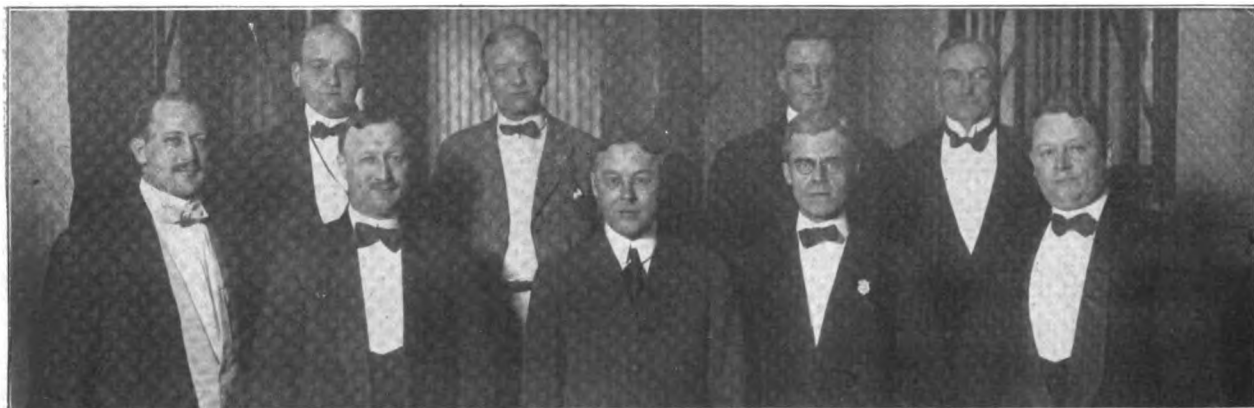
MONTREAL SHOW SALES TOTAL \$250,000.

OF THE 42 makes of cars displayed during the first week of the annual Montreal automobile show, held under the auspices of the Automobile Traders' Association in the drill hall, Montreal, Que., Jan. 24-31, 34, or about 80 per cent., were of American manufacture. Of the 14 makes of commercial vehicles shown the second week, Feb. 3-7, 10, or about 70 per cent., were produced in the States. These facts, taken in connection with the story told by the report of exports and imports, issued by the Department of Commerce, which shows Canada to be the American automobile industry's best customer, are of decided interest.

The Montreal show is regarded as a local dealers' exhibition. The Canadian national show is held in Toronto. But Montreal is an important factor in the purchasing end of the in-

met with entire satisfaction, both on the part of the exhibitors and the visitors. The total number of sales for the first week is reported at \$250,000. Among those who made display were the following, it being understood that many of the accessory concerns were represented both weeks:

Pleasure Cars—Automobile Francals, Ltd., Berliet; Albion Motor Company, Arrol-Johnston; Cadillac Motors, Ltd., Cadillac; Comet Motor Company, Packard, Chalmers; Case Company, Case; Dansereau & Co., Stevens-Duryea; Ford Motor Company, Ford; Frigon & Baker, Winton; Fournier & Rodier, McFarlan; Girdwood & Forest, Reo; Gareau Motor Company, Kissel-Kar, Marmon, National, Grant; Grenier-Warrington Company, Pierce-Arrow; Gadbois, Ltd., Palmer-Singer; S. Gagnon & Co., Jeffery; Grothe & Juneau, Franklin; J. L. Gordon & Co., Oldsmobile; N. Herbert & Co., Pullman; Haynes Auto Import Company, Haynes; Keeton Motor Company, Keeton; Legare-Gadbois Company, Hudson, Studebaker; V. Levesque, Abbott-Detroit; Mutual Motor Company, Locomobile, Mercer; Motor Transport Company, Peerless; Major Motor Company, Chandler; McLaughlin-Bulck Company, McLaughlin-Bulck; Oxford Manufacturing Company, Oxford; Pope-Hartford Motor Company, Overland,



Committee in Charge of the Buffalo Automobile Show, including George H. Dreybus, Manager; Charles F. Monroe, Treasurer; John J. Gibson, Secretary; Howard B. Smith, Director; Arthur W. Halle, Director; Ralph E. Brown, President; Edward C. Bull, Director; Gustave C. Miller, Vice President.

dustry in the Dominion. The largest gain in the volume of business done by Canadian dealers during 1913, which was about 75 per cent. over that done in 1912, is credited to that city. The number of high grade limousines and touring cars seen on the streets is such as to occasion decided comment on the part of American visitors, and the business men are fast indicating that they appreciate the economy and efficiency of motor trucks.

This year's event was staged under the management of T. C. Kirby. Two shows were held last year, and in order that all makes of pleasure and commercial vehicles represented in the city might be assembled at the same time, it was decided to divide the exhibition, giving over one week to the former types and a second to trucks and business wagons. The plan seems to have

White; Primm & Co., Simplex; Rousseau Bros., Cole; Russell Motor Company, Russell-Knight; P. A. D. Robert, Jackson; Stockwell Motor Company, Lozier; Spencer Motor Company, Brockville Atlas; Tate Electric Company, Tate electric; Wolseley Motor Company, Wolseley; Weldon Motor Company, Sunbeam, Humber.

Commercial Vehicles—Albion Motor Company, Albion; Automobile Francals, Ltd., Berliet; Canadian Pneumatic Tool Company, Little Giant; Canadian Fairbanks Morse Company, Mack, Lansden electric; Comet Motor Company, Packard; Grenier-Warrington Motor Company, Pierce-Arrow; Jones & Glasgo, Foden steam; Legare-Gadbois Company, Gramm, Stewart; Pope-Hartford Motor Company, White; McLaughlin Carriage Company, McLaughlin; Rousseau Bros., Kelly; Motor Transport Company, Peerless.

Accessories—Bowser Company, tanks; Canada Cycle & Motor Company, general line; Canadian Fairbanks Morse Company, general line; Canadian Consolidated Rubber Company, Ltd., tires; Dunlop Rubber Company, tires; Dominion Chain Company, Weed chains; Express Oil Company, oils and tanks; Franco-American Automobile Company, Ltd., general line; Grenier-Warrington Motor Company, Republic tires; Goodyear Tire Company, Goodyear tires; Gutta Percha & Rubber Company, tires; Gaulois Tire Agency, Gaulois tires; Higgins & Lee, Firestone tires; Independent Tire Company, tires; Imperial Oil Company, oils and tanks; Kelly Tire Company, tires.

TWO DISPLAYS FOR BUFFALO DEALERS.

BUFFALO, N. Y., is one of the few cities of the country which will have an exclusive motor truck show. The pleasure car exhibition of the Buffalo Automobile Dealers' Association was held Feb. 2-7, in the Broadway Auditorium, and this was followed by the commercial display, Feb. 9-14. Judging from the interest manifested by the people of the district for which the city is the commercial centre, as represented by the attendance during the first week, the dealers of Buffalo made no mistake in deciding upon this plan. Many business men are known to be interested in the power wagon, and this exhibition will be the means of directing their particular attention to this end of the industry for one full week.

An accompanying illustration shows the interior of the building during the progress of the pleasure car display, and it will be noted that the main hall is admirably adapted to an exhibition of this character. The trucks and business wagons will occupy the same setting. The splendid success which has resulted wherever automobile shows have been held thus far this year was repeated in Buffalo, and the dealers appear to be warranted in their optimistic view of the outlook for business during 1914. No definite attempt has been made to sum up the sales, but it is stated that these were more numerous than in past years. The accessory exhibit was particularly pleasing and the list of goods represented therein was larger than ever before in Buffalo.

The event was held under the personal management of George H. Dreybus, assisted by the following committee representing the association: President Ralph E. Brown, Vice President Gustave C. Miller, Secretary John J. Gibson, Treasurer Charles F. Monroe and Directors Edward C. Bull, Howard B. Smith and Arthur W. Haile. The following were included among the exhibitors:

Pleasure Cars—Meyer Motor Car Company, Maxwell; A. W. Halle Motor Car Company, Studebaker; Buffalo KisselKar Company, KisselKar; Buick Motor Company, Buick; Buffalo Electric Vehicle Company, Buffalo-Babcock electric; Monroe Motor Car Company, Briscoe, Wahl, Marion; Packard Motor Car Company, Packard; Cole Motor Car Company, Cole; National Motor Car Company, Na-

tional; George Ostendorf, Franklin, Detroit electric; Waverley Electric Sales Company, Waverley electric; Ford Motor Company, Ford; Paige-Buffalo Company, Paige; Poppenberg Motor Car Company, Marathon; Kane-Cadillac Company, Cadillac; Oakland Distributing Company, Oakland; John J. Gibson Company, Mitchell; Oldsmobile Company, Oldsmobile; Ralph E. Brown Motor Car Company, Chandler; J. A. Cramer, Marmon, Jeffery, Regal; A. L. Dixon, Velle; Overland-Buffalo Company, Overland; Buffalo Hudson Sales Company, Hudson; Mason B. Hatch, Inc., Chalmers; J. I. Case Threshing Machine Company, Case; Louis Engel, Jr., Cartercar, Partin-Palmer; Harry A. Hall, Detroit; Pierce-Arrow Sales Company, Pierce-Arrow.

Accessories—Chas. E. Miller, general line; Klepfer Bros., Joseph Strauss & Sons, Hurd & Landsheft, Wayne Oil Tank & Pump Company, Iroquois Rubber Company, Keystone Lubricant Company, John W. Frey, Standard Limousine Top Company, American Kusion Kar Tire Company, Clifford Company, Kendall Refining Company, F. A. Lobee, Jaynes Auto Supply Company, Pyrene Manufacturing Company, Miller Sales Company, Great Western Oil Company, Indian Refining Company, Niagara Metal Weather Strip Company.



General View in the Broadway Auditorium, Buffalo, N. Y., During the Pleasure Car Show.

One of the meetings of special interest held during the recent Chicago automobile show was a conference between the licensees under the Knight motor patents, and the holder of those patents. There does not appear to have been any attempt to form an organization, but the following concerns were represented: F. B. Stearns Company, Cleveland, O.; Moline Automobile Company, East Moline, Ill.; Lyons-Atlas Company, Indianapolis, Ind.; Willys-Overland Company, Toledo, O., and the Knight & Kilbourne Patents Company. Charles Y. Knight, inventor of the engine, gave a talk, in which he stated as his opinion that more progress had been made during the past year in the development and commercial growth of the sleeve valve motor than had occurred during the previous five years.

VANDERBILT AND GRAND PRIZE RACES.

ENTRIES for the Vanderbilt Cup and Grand Prize races closed at midnight, Feb. 9, and any blanks placed in the mail previous to that hour will be considered. From present indications, however, there will be 11 contestants in the former event and 12 in the latter. The race for the Vanderbilt Cup will be held over the Santa Monica road course, Feb. 21, and that for the Grand Prize, Feb. 23. The entry list reads as follows at present:

Vanderbilt and Grand Prize.

Car	Driver	Entrant
Stutz	Anderson	Stutz Motor Car Company.
Delage	Toft	Leotia K. Northam, Inc.
Mercer	Wishart	Mercer Automobile Company.
Mercer	Pullen	Mercer Automobile Company.
Stutz	Cooper	Walter M. Brown Company.
Isotta	Grant	W. Zeigler.
Simplex	.....	Leotia K. Northam, Inc.
Mercer	Oldfield	George R. Bentel.
Sunbeam	Marquis	W. Zeigler.
Mercedes	De Palma	E. J. Schroeder.
Mercedes	Pilette	E. C. Patterson.

Grand Prize Alone.

Flat, Tetzlaff, Savage Tire Company.

It will be noted, from examination of the above list, that these two events present an entirely new situation in American automobile racing circles, since this is the first time that a woman has been permitted to make entry. The rules of the contest board of the American Automobile Association prohibit a woman from taking part in an event of this character, either as driver, mechanic or entrant. Mrs. Northam appears to have found a way to avoid the prohibition of this rule by getting herself incorporated, and it is understood that she intends to enter cars in all the long distance races held during 1914, including the 500-mile race on the Indianapolis motor speedway.

It is also worthy of note that this is the first time that these two great American road racing classics have been held on the Pacific Coast. The Vanderbilt Cup race was originated in 1904, and for a number of years was held over a course on Long Island. In 1911, it was shifted to Savannah, Ga., where it was held in conjunction with the Grand Prize, which was originated in 1908 and which had been held over the Savannah course twice before. In 1912, both races were held near Milwaukee, Wis. There was no Vanderbilt Cup event in 1907 or 1913, and the Grand Prize has been held only in 1908, 1910, 1911 and 1912.

Thus it will be seen that the forthcoming Vanderbilt Cup event will be the ninth for this award, and the Grand Prize race will be the fifth

of that name. The results in the previous contests are set forth in an accompanying table.

The races this year will be started promptly at 10 in the morning. Fred J. Wagner will act as starter, and the other officials will be as follows: Referee, George Purdy Bullard, attorney-general for Arizona, who founded the annual desert classic, known as the Los Angeles-Phoenix road race; judges, A. B. Daniels of Los Angeles, C. H. Cobb of Fresno, and John F. McLain of San Francisco; chief scorer, E. W. Leslie of Los Angeles; technical committee, W. E. Bush, C. J. Smith and F. W. Young, all of Los Angeles.

The course is the same as that over which the annual Santa Monica road races have been held in recent years, and is regarded as one of the fastest in the world. Harvey Herrick secured a world's road record over it with a National car in 1911, and the present world's road record, held by Teddy Tetzlaff in a Fiat at 78.5 miles an hour, was made in the Santa Monica road race of May 4, 1912.

Each lap is 8.401 miles in circumference. The Vanderbilt Cup race will cover the course 35 times, making a total distance of 294.035 miles, while the Grand Prize will be for 48 laps, or 403.248 miles.

In connection with the holding of these races, the Bosch Magneto Company, New York City, for which the Motor Parts Company, Boston, Mass., is New England representative, following a practise which it originated some years ago, has set aside \$1900, to be awarded as special prizes. In case the car is fitted with a Bosch magneto, the winner in the Grand Prize will receive \$500, the driver in second place \$150 and the driver in third place \$100. The same condition applies in the Vanderbilt Cup race, with the exception that the special prizes are: First, \$300; second, \$150; third, \$100. In addition, since the equipment on some cars is not fully Bosch, but Bosch plugs are used, a second set of prizes has been set aside, providing for an award of \$100 to the

Previous Vanderbilt Cup Winners.

Year	Car	Driver	MPH
1904	Panhard	Heath	52.02
1905	Darracq	Hemery	61.50
1906	Darracq	Wagner	63.00
1908	Locomobile	Robertson	64.40
1909	Alco	Grant	62.08
1910	Alco	Grant	65.02
1911	Lozier	Mulford	74.07
1912	Mercedes	De Palma	68.82

Previous Grand Prize Winners.

Year	Car	Driver	MPH
1908	Flat	Wagner	65.04
1910	Benz	Bruce-Brown	70.55
1911	Flat	Bruce-Brown	74.45
1912	Flat	Bragg	68.40

driver in first, second or third place in either race, with car thus equipped. Another interesting point is that Bosch equipment has so invariably been used by winners of all big and important races, that the money is offered by the Bosch Magneto Company with a feeling that it actually will be won.

SHOW IN PORTLAND, ORE.

Elaborate Decorative Scheme Provides Setting for the 100 Machines on Exhibition.

About 100 machines were displayed at the fifth annual show of the Portland Automobile Trade Association, in Portland, Ore., Jan. 27-31. The event was under the management of Capt. E. H. Gray, president of the association, and was a decided success in every respect.

The general color scheme was green and white, but the side walls were entirely hidden by a painting designed to represent a road leading out of the city, past the Automobile Club, along the Sandy river, and to Crater lake, Mt. Hood and the Three Sisters, with St. Helens, Mt. Rainier and the Columbia river in the distance.

The second floor was given over to accessories, and this section was even more complete than in past years. No attempt was made to decorate the truck section, in the basement.

FINE DISPLAY IN PORTLAND, ME.

Second Annual Event for Dealers in That City Opens in City Auditorium.

The second annual show of the Portland Automobile Dealers' Association, Portland, Me., was opened in the City Auditorium, Jan. 9, for the remainder of the week. The number of exhibitors was such that only cars and trucks were displayed on the main floor, the accessory booths being located in the lobby. The list of exhibitors includes the following:

Vehicles—Portland Chevrolet Company, Chevrolet; Maine Motor Car Company, Peerless, Stevens-Duryea, Paige, Chalmers; Miles B. Mank Motor Car Company, Cadillac; Arthur F. Talbot, American; Franklin Motor Car Company, Franklin; Gilson Auto Company, Mitchell, Studebaker; Portland Company, Knox, Cole; F. A. Nickerson Company, Pierce-Arrow; Spear Auto Company, Ford, Maxwell; W. B. Thombs, Buick; Stoughton-Folkins Company, Oakland; Sanborn Motor Company, Speedwell; E. E. Wentworth, Overland; Payson Motor Truck Company, GMC trucks; Hollander Motor Company, Cartecar.

Accessories—York & Boothby, electrical supplies; L. W. Cleveland Company, general line; T. L. Merrill Company, general line; Standard Oil Company, lubricants; Wiley & Smith, polishes; Maine Motor Car Company, general line; Talbot, Brooks & Ayer, supplies; Standard Vulcanizing Company, vulcanizers; Maine Auto Tire & Supply Company, tires, general line.

RESULTS AT MINNEAPOLIS.

Dealers Are Very Optimistic at Close of Seventh Annual Display.

Attendance at the seventh annual show of the Minneapolis Automobile Trade Association, which was held in the state armory, Minneapolis, Minn., Jan. 31-Feb. 7, was larger than ever before, and the number of sales was large in proportion. There was every evidence to indicate that the dealers in that city are very optimistic as to the possibilities of the 1914 season.

The show occupied 75,000 square feet of floor space, or 5000 feet more than last year. Forty-one dealers were represented, three of these showing electric cars, and four cyclecars. There were also 17 makes of trucks on display.

MOTORCYCLE PLANT SOLD.

Bosch Magneto Company Buys Brockton Factory and Disposes of It Again.

The property of the American Motor Company, Brockton, Mass., which was sold under mortgagee's sale Jan. 20, was purchased by the Bosch Magneto Company, New York City, and immediately transferred to G. M. Green and William T. Marsh, the latter the treasurer of the first named concern. It is understood that steps are under way for a reorganization of the company. Mr. Marsh is authority for the statement that the name of the new company will be the Sterling Manufacturing Company.

Elbert Hubbard has issued, from the Roycrofters press, East Aurora, N. Y., a handsome little brochure, entitled, "Opportunity, Being a Little Journey to the Republic Clubhouse". The text gives an interesting account of the writer's recent visit to the employees' clubhouse, recently opened by the Republic Rubber Company, Youngstown, O., an illustration and brief description of which was presented in the Jan. 25 issue of The Automobile Journal.

The Keystone Vehicle Company, Reading, Penn., has elected the following directors for the ensuing year: Robert E. Brooke, George Brooke, Edward C. Nolan, J. Bennett Nolan, John L. Coxe, F. Burmeister, H. John Herb and H. P. Burmeister. The directors have chosen the following officers: President, H. J. Herb; treasurer, J. E. Ely; secretary and general manager, H. P. Burmeister.

WILLYS-KNIGHT HAS MANY REFINEMENTS.

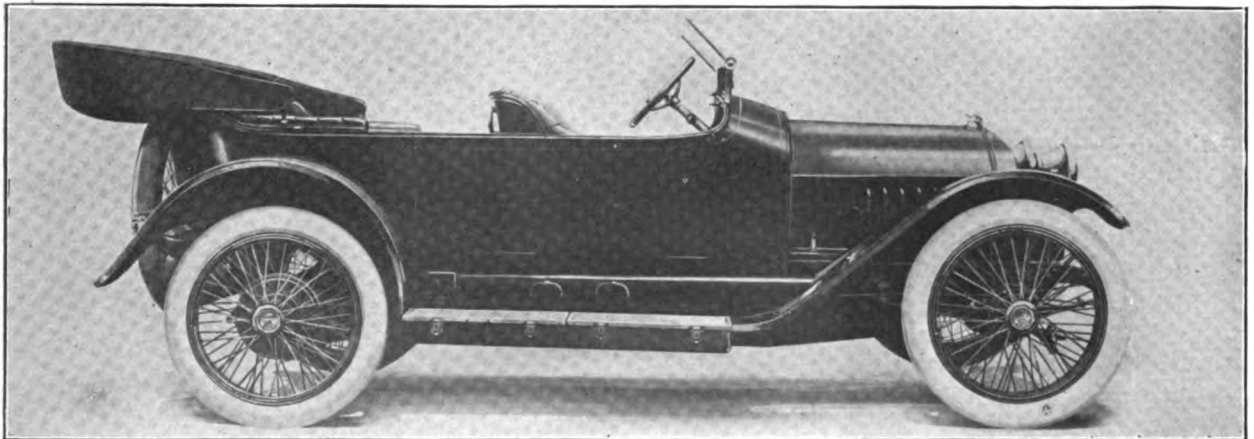
AMONG the latest entrants in the sleeve valve class is the Willys-Knight car, made in a five-passenger touring car and roadster, which was exhibited for the first time at the New York show. When it was announced that the Willys-Overland Company had taken over the Edwards-Knight, and would manufacture the machine at the Garford plant at Elyria, O., a number of important changes were anticipated by those cognizant of the progressiveness of the Willys-Overland Company. The new car still retains a number of interesting Edwards-Knight features such as the oil submerged worm gear rear axle, Lanchester cantilever rear spring suspension and wire wheels.

The Willys-Knight motor incorporates the

drop forging of an alloy steel, and is hollow with the exception of the cheeks. It rotates in five large babbitt lined bronze bearings. The connecting rods are of the tubular section, drop forged.

The valve sleeve eccentric shaft is actuated by a silent chain, and a similar member drives an auxiliary shaft on the right hand side of the motor, operating a very large centrifugal water pump, magneto and a gear for driving the power tire pump, which is mounted on a bracket just above the pump. Use of the tire pump is obtained by meshing a gear with a similar member located on the shaft between the magneto and water pump.

The magneto coupling is not only well de-



Five-Passenger Willys-Knight Touring Car, a Handsome Machine Equipped with Latest Design of Knight Sleeve Valve Motor.

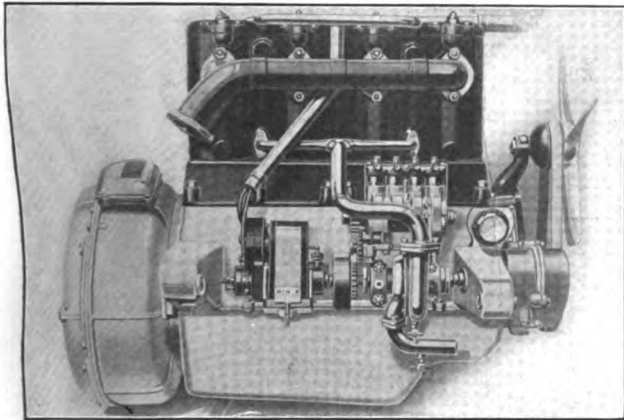
latest improvements made in the Knight engine and is produced at the Elyria plant. The cylinders are cast in pairs and, as in all Knight engines, the heads are constructed separately and are water jacketed. The water jackets of the cylinders extend the full length of the bores. The cylinder dimensions are four by 5.5 inches and the S. A. E. rating of the horsepower is 25.6, but it is stated that the motor develops 40-45 at normal speed. One reason advanced for the power developed is that the combustion chamber formed by the concave cylinder head and piston, is as nearly spherical as possible on a practical engine. It is also pointed out that much of the heat units lost through the water jackets is turned into useful energy in the Willys-Knight motor.

The crankcase is divided, four arms integral with the upper half providing a four-point suspension of the power plant. The crankshaft is a

signed, but makes timing a simple matter. Ignition is by the latest type Simms magneto, providing a hot spark at low motor speeds. A noticeable feature of the ignition system is that the switch is eliminated, the spark lever being fully retarded when it is desired to stop the operation of the motor. Provision is made, however, for locking the ignition circuit. Carburetion is by a specially designed Stromberg.

The lubrication system is simple, and the supply of oil is proportioned to the speed of the motor. This is obtained automatically, and by a connection with the throttle. The pump is of the plunger type, located in the crankcase, and a perfect distribution of the lubricant is secured through grooves cut around both sleeves from which the oil is distributed and through which the excess is returned to the reservoir. The capacity of the oil container is three gallons.

The clutch is a leather faced cone, 15 inches in diameter and having a 2.25-inch face. Easy engagement is assured by the use of eight flat



Right Hand Side of Willys-Knight Motor, Showing Method of Driving, Water Pump, Magneto and Power Tire Pump.

springs. Between the clutch and gearset are two universal joints, the rear being a leather construction, which not only allows for easy displacement, but reduces stresses created by a sudden application of power. The gearset provides four forward speeds, with a direct drive on the third. Between the gearset and the rear axle are two universal joints, reducing vibration to a minimum.

The rear axle is of the worm type, with the worm gear submerged in oil. The worm is located underneath the gear, and the road clearance is ample to meet all conditions of service. The housing is of pressed steel, with worm and wheel supported on an under cover, and a large inspection plate permits of easy access. The construction is reinforced substantially by two ample sized truss rods. Annular ball bearings are utilized throughout the axle, and the driving shafts are of the full floating type, of generous dimensions and of a high grade material.

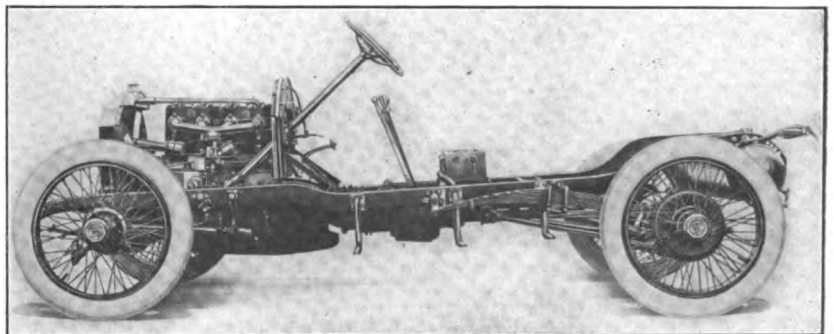
The rear construction is a departure from conventional lines, as will be noted by an accompanying illustration. In the first place, the rear springs are of the floating type, the Lanchester cantilever design, and are attached directly to the rear axle, but slide over and bear upon a roller which permits of a free backward and forward movement. Provision is made, however, for excessive action or accident to the radius

rods. The spring may be described as an inverted semi-elliptic, fulcrumed at its centre to the frame and shackled at front. Easy riding qualities and an absence of vibration are qualities of the construction emphasized. Provision is made for lubrication.

The radius rods are so attached as to bring them in the same plane as the propellor shaft, and a torque arm is also provided, being connected at its forward end by a spring link with a ball and socket joint. The front springs are semi-elliptic, 38.5 by 2.25 inches. The rear members are 52 inches long, 2.5 wide and have nine leaves.

Two sets of brakes are provided, both on the rear wheels. They are of the internal expanding design, the service being on 16-inch and the emergency on 12-inch drums, both with two-inch face. The frame is of pressed channel section steel, 4.0625 inches deep and 3.25 wide, hot riveted, and provided with a double drop. The various units are supported without sub-frames. The cellular type of radiator is so mounted that it is not affected by road shocks, etc. Its capacity is ample to meet all conditions of service.

The driver is placed at the left, with the gear shifting lever operating through a ball and socket joint in the gearset housing. The emergency brake lever is just to the right of the speed lever, with the locking quadrant below its fulcrum and to the right of the transmission case cover, where the pull rod is attached. The Warner speedometer is driven by a gear at the rear of transmission, the driving member being secured to a section of the universal joint. The steering gear is of the worm and gear type, enclosed in a grease tight case, and eccentric bushings are fitted to take up wear. The steering column is set at a comfortable angle and is surmounted by an 18-inch wheel. Spark and throttle levers are mount-

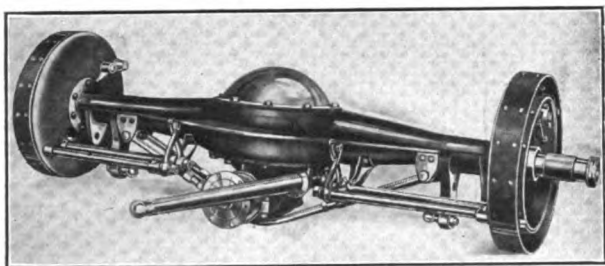


Chassis of Willys-Knight, Having a Low Centre of Gravity and Incorporating Many Refinements.

ed on the wheel. Usual accelerator is provided.

The wheels are of the standard demountable wire type with quick detachable rims, and the

tire size is 36 by 4.5 inches all around. The wheelbase is 120 inches and the tread standard, 56. One of the features is the short turning ra-



Worm Driven Rear Axle of Willys-Knight, Showing Substantial Proportions and Torque Arm.

dus, it being stated that the car can be turned in 18 feet.

The electric motor starting and lighting system is the U. S. L., which is built into the flywheel of the motor. The unit is a motor-generator in that it functions as a motor for starting and automatically operates as a dynamo for lighting or charging the battery. A feature of the system is the incorporation of a manually operated switch by means of which the driver may cut out the dynamo, a practise in vogue abroad. This prevents any possibility of overcharging the battery and permits of locking the circuit when the car is left unattended.

The body is an all-steel construction, placed over a wooden frame, with rolled moldings. The doors are equipped with lever latches and case hardened concealed hinges. The upholstery is extra deep, being of the finest hand buffed leather over special coiled springs and imported hair. The front cushions are adjustable to enable the driver to operate the pedals easily.

All trimmings are nickel plated. The floor and toeboard of the driver's compartment are covered with linoleum, while carpet is utilized in the tonneau. Ample space for the carrying of goggles, veils, etc., is provided by large pockets in the doors.

The usual foot and robe rails are included in the equipment, and the tool boxes, which are located under the running boards, are extra long and capable of storing a complete touring equipment. A one-man top is standard equipment, and a storm apron and side curtains are included. The one-piece windshield is a special design, and provision is made for ventilating the forward compartment. The power tire pump is a four-cylinder unit. The balance of the equipment includes electric horn, extra wire wheel and carrier, Truffault-Hartford shock absorbers in front, jack, tools, etc.

NEW BUILDING IS COMPLETED.

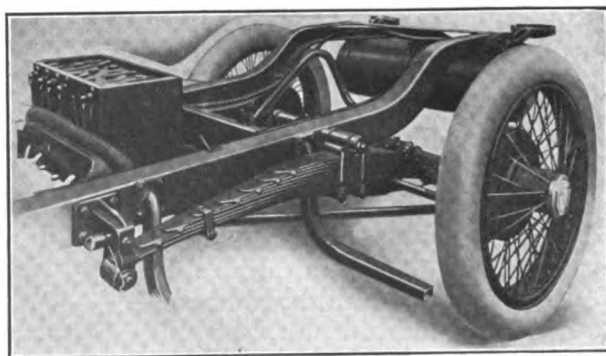
Teetor-Hartley Motor Company Also Takes Over Business of Older Concern.

Announcement is made from Hagerstown, Ind., that the new factory building of the Teetor-Hartley Motor Company is completed and preparations are being made for its immediate occupancy. The structure is three stories high, 144 feet long and 66 feet wide, and is of brick.

The management of the concern remains unchanged, the following officers having been re-elected at the first of the year: President, J. H. Teetor; vice president, H. W. Keagy; secretary, C. N. Teetor; treasurer, W. E. Immel. It is stated, however, that all business heretofore conducted under the name of the Light Inspection Car Company, will be carried on by this concern in the future.

The Light Inspection Car Company was organized in 1895 for the purpose of building light inspection cars for use on railroads. A few years later a stationary gas engine became one of its productions. In 1898, when the automobile gave promise of being a commercial factor, C. N. Teetor invented the well known Teetor T head motor, and very soon the demand for this engine reached such proportions that it was necessary to dispose of the stationary engine business and devote greater attention to the Teetor motor.

The first annual automobile show in Easton, Penn., will be held in the state armory, Feb. 18-21, under the auspices of Co. I, 13th Infantry, N. G. P., and the personal direction of H. W. Lasher as manager. The show has been advertised extensively throughout the district of which Easton



Langhester Cantilever Rear Springs Employed on the Willys-Knight.

is the centre, and special effort will be made to attract farmers on Thursday of show week. One evening will be designated as Society Night.

GENERAL NEWS OF THE INDUSTRY.

Licensees Under Canfield Spark Plug Patent Form Association---Company Organized to Produce Kerosene Burning Cars---Changes in Personnel, Etc.

SEVENTEEN of the 31 spark plug manufacturers licensed under the Canfield patent, held by the A. R. Mosler Company, Mount Vernon, N. Y., formed the Association of Spark Plug Manufacturers in Chicago during the progress of the automobile show in that city. The new association decided on a definite policy, which is represented by the following:

To foster the interests of those engaged in the trade or business of manufacturing spark plugs or parts thereof.

To procure uniformity and certainty in the customs and usages of such trade or business.

To reform abuses relative to such trade or business. To secure freedom of its members from unjust or unlawful exactions.

To diffuse accurate and reliable information as to the standing of merchants and others dealing with the members, and as to the condition and development of the trade or business in which the members are engaged in the United States.

To advocate the enactment of just and equitable laws affecting the members.

To settle differences between the members.

To promote a more enlarged and friendly intercourse among the members.

Only two officers appear to have been elected at this meeting, these being J. W. Fisher of the Silvox Company, New York City, as secretary, and A. R. Mosler as treasurer. A committee, consisting of R. E. Mills, Rajah Company; R. A. Stranahan, Champion Spark Plug Company; Albert Champion, Champion Ignition Company; Emil Grossman, Emil Grossman Manufacturing Company, and E. M. Benford, Benford Manufacturing Company, was appointed to investigate and report on all matters relating to the spark plug industry and to bring to the notice of the association all infringers of the Canfield patent, those who are conducting their business on a false basis, or, in other words, misrepresenting their products, and those who are in any way harmful to either the industry or the consumer's welfare. This committee, of which Mr. Benford is chairman, also has power to set the date for the annual meeting in January.

WIRE WHEEL ACTION.

Rudge-Whitworth Company Said to Be Co-Operating with Houk Concern.

Advices from Buffalo, N. Y., said to be based on cables from Liverpool, England, indicate that Rudge-Whitworth, Ltd., of England is co-oper-

ating with the Houk Manufacturing Company of Buffalo, in adjusting the differences existing between the latter concern and the Standard Roller Bearing Company of Philadelphia, which recently brought suit, claiming to be the sole American licensee for the manufacture of Rudge-Whitworth wire wheels or wire wheels embodying features of these.

George W. Houk, president of the Houk Company, sailed from Liverpool, Feb. 1, having been to the Rudge-Whitworth factory for a conference with the parent company in connection with the Houk wire wheel, produced by his concern, and in which there are said to be incorporated constructional features covered by the Rudge-Whitworth patents. It is understood that, as a result of this conference, Mr. Houk cabled his concern to prepare for enlarged manufacturing facilities.

TO BUILD KEROSENE CARS.

Richard Automobile Manufacturing Company Is Organized in Cleveland, O.

Francois Richard, a French engineer, is said to have interested American capital in the production of a car which will be fitted with a motor and carburetor designed especially to utilize kerosene. The factory is to be located in Cleveland, O., according to information from that city.

The Richard Automobile Manufacturing Company has been organized in Cleveland with capital of \$250,000. It is understood that F. M. Brady of the Cleveland Brick & Clay Company, and G. C. Gordon of the Park Drop Forging Company are associated with Richard in the enterprise.

An experimental car is said to be under construction in New York City, although many of the parts are being made in Cleveland from designs furnished by Richard. He claims that with an engine of the four-cylinder, four-cycle type, having a horsepower of 90, he will be able to drive 30 miles to a gallon of kerosene. According to the public announcement, the car will be made in one chassis and body design, this being a seven-passenger touring car with 128-inch wheelbase.

GOODRICH'S ANNUAL REPORT.**Statement Made Public at Close of Year Shows Profits of \$2,600,000.**

According to a statement made public by the B. F. Goodrich Company, Akron, O., maker of Goodrich tires, the profits for the year 1913, after deducting proper allowances for maintenance, depreciation and other items, were approximately \$2,600,000. This result added to the surplus carried over from Dec. 31, 1912, shows an undivided surplus of \$700,000, after paying a full year's dividends of preferred stock and one per cent. on common stock.

The financial position of the company is stated to have been materially strengthened during the year. The quick assets, as of Dec. 31, 1913, were approximately \$20,000,000, against current liabilities of \$4,000,000, so that the quick assets are now five times the current liabilities. At the time of the last annual report the ratio was 3:1.

TO PRODUCE R-C-H CARS.**C. P. Seider Will Continue Manufacture Under Old Firm Name.**

C. P. Seider of Detroit has taken over a large portion of the assets of the R-C-H Corporation of that city, the entire property of which was purchased recently at receiver's sale by the Todd, Frank, Friedberg Company. It is announced that a new concern will be formed with the old name, and that the manufacture of R-C-H cars will be continued by it.

A. H. Collins, a former distributor of these machines, is associated with Seider in the deal, although it would appear that for the present the holdings are in the name of the latter. These include practically everything pertaining to the assembly of cars, including buildings and real estate, but not the foundry, machine shop or forging plant.

DAYTON TRUCK COMPANY.**Assets Acquired by Recently Incorporated Durable Dayton Company.**

Articles of incorporation have been filed with the secretary of state in Columbus, O., for the Durable Dayton Company of Dayton, O., which is to succeed the Dayton Auto Truck Company, recently petitioned into bankruptcy. The property was sold at trustee's sale to Attorney H. P.

Williamson, who is understood to have represented the new concern.

The factory is in operation, and, according to an announcement by Mr. Williamson, will continue, although the plans of the new company have not been made public as yet.

MOSKOVICS WITH MARMON.**Resigns as Secretary of Jones Electric Company to Help Sell Well Known Car.**

Frederick E. Moskovics, secretary and sales manager of the Jones Electric Company, Chicago, has resigned to join the sales organization of the Nordyke & Marmon Company, Indianapolis, Ind., maker of the Marmon car. He is one of the best known men in the industry and his acquisition by the Indianapolis concern is one which merits congratulations for both.

Mr. Moskovics is another graduate from the bicycle industry, where he early made a name for himself as a salesman of exceptional ability. His first work in the automobile field was in connection with the introduction of a foreign tire to this country. Then he entered the parts business in New York City, selling practically everything that can be used in motor car construction.

Later he served an apprenticeship with Gottlieb Daimler at the latter's German factory. Then he designed and built the Yellow taxicab in New York City. Next he organized the Motor Pacing Association of New York, helped to build the Los Angeles motordrome and assisted in the organization of the Society of Automobile Engineers. Perhaps he is best known as manager of the sales department of the Remy Electric Company, a position he relinquished to become secretary of the Jones Company.

ANGLADA ORGANIZES COMPANY.**Liberty Cyclecar Will Be Produced in New York by Liberty Motor Company.**

Final details have been completed for the production of the Liberty cyclecar, designed by Joseph Anglada, a well known member of the Society of Automobile Engineers. The concern will be known as the Liberty Motor Company, and it is stated that a suitable factory site has been secured in New York City and that manufacturing will commence shortly. The officers of the company are: President, Joseph Anglada; secretary, C. S. Ackley of the McKiernan Terry Drill Company, and treasurer, A. W. Drake, formerly head of the Harward Electric Company.

PORTER SUCCEEDS HOUCK.**Will Direct the Sales Policy for Producer of Car-Nation and Keeton Cars.**

Following closely upon the announcement that the American Voiturette Company, Detroit, would take over the manufacture and sale of Keeton cars, in addition to its Car-Nation small car line, comes the statement that W. G. Houck, who has held the position of sales manager since the organization of the company early last year, has resigned. His resignation took effect Jan. 21, and, as yet, his plans for the future have not been made public.

Mr. Houck has been succeeded by Joseph D. Porter, one of the pioneer salesmen in the industry. He has been associated with the Garford Company of Elyria, O., for the past seven years, and during the last two years of that connection he was sales manager. In securing Mr. Porter's services, General Manager H. H. Newsom of the American Voiturette Company has acquired a man of wide experience and one who has personal acquaintance with a large number of dealers throughout the country.

WILLYS IN CANADA.**New Concern Will Take Over and Operate Old Schacht Plant in Hamilton.**

Announcement is made of the organization of the Willys-Overland Company of Canada, Ltd., with John N. Willys as president. The new concern will locate in Hamilton, Ont., where it has acquired the plant formerly operated by the Schacht Motor Company. The other officials of the concern will be announced later.

The company will manufacture pleasure cars and business wagons, presumably bearing the same names as those produced by the Willys-Overland Company and its subsidiaries in this country. The capital is placed at \$500,000.

STEWART-WARNER STATEMENT.**Speedometer Concern Makes Public Financial Condition at Close of Year.**

In a statement of its financial condition at the close of business, Dec. 31, 1913, the Stewart-Warner Speedometer Corporation of Chicago discloses that the earnings for the year, after deducting charges and all allowances, were \$1,145,132, and the surplus \$573,027. The net earnings

are equal to seven per cent. on the \$1,000,000 preferred stock and 10.5 per cent. on the \$10,000,000 common outstanding.

The consolidation was formed in 1912, and the above net earnings are compared with those of previous years as follows: 1913, \$1,145,132; 1912, \$917,373; 1911, \$846,250; 1910, \$842,807; 1909, \$596,843. Except for 1913, these figures are taken from the reports of the companies entering into the consolidation.

PELLETIER WITH LOZIER.**Will Act as Advertising Counsel While Still Serving Maxwell Motor Company.**

One of the interesting announcements of the Chicago show week was that made by President Joseph M. Gilbert of the Lozier Motor Company, Detroit, in which it was stated that E. LeRoy Pelletier had been engaged as advertising counsel for that concern. Mr. Pelletier already holds the same position with the Maxwell Motor Company of that city, and it is explained that he will continue that connection while acting for the Lozier concern.

The two men have been friends since the inception of the automobile industry, and the same thing is true with respect to Paul Smith, sales manager for the Lozier, who served with Mr. Pelletier in the old E-M-F Company. The last named is one of the best known advertising men in the country, in this field, and the Lozier company is to be congratulated in securing his services.

COMPLETES REORGANIZATION.**New Columbus Buggy Company Starts Business with Capital of \$500,000.**

The New Columbus Buggy Company was incorporated in Columbus, O., Jan. 24, with capital of \$500,000, all common stock. It is understood that this stock is held by about 85 per cent. of the creditors of the former concern, who have been operating the plant for the past eight months. It is further stated that the claims against the old company amounted to \$464,000, which will be taken up, leaving a balance of \$36,000 for organization expenses.

The officers of the new company are: President, George W. Lattimer; vice president, E. R. Sharp; secretary, D. N. Postlewaite; treasurer, George W. Bright. The board of directors is composed of the following: O. A. Miller, George

W. Bright, George W. Lattimer, E. R. Sharp, F. O. Schoedinger, Robert H. Jeffery and T. J. Kavanaugh. The company manufactures gasoline and electric cars and horse drawn vehicles.

ORGANIZE KELLEY COMPANY.

Will Act as American Sales Agent for Well Known British Manufacturer.

Announcement is made from New York City of the organization of the Kelley Company, which will act as American selling agent for a line of windshield joint fittings and other specialties made by George Beaton & Son, Ltd., London, England. The concern is composed of P. J. W. Kelley, formerly with the Splittorf interests, and James M. Carples, a well known importer.

The Beatonson specialties were formerly made in this country, and are held to be covered by American patents. However, the contract was cancelled for cause some time since. During a recent visit to Great Britain, Mr. Carples learned of this and immediately secured the option on the importing and manufacturing rights, which have been turned over to the Kelley company.

TO INCREASE ITS CAPITAL.

Goodyear Tire & Rubber Company Has Proposition to Add Nearly \$4,000,000.

The stockholders of the Goodyear Tire & Rubber Company, Akron, O., have been notified of a meeting to be held March 3, to act upon a proposition to increase the capital stock of the company by nearly \$4,000,000. This will include the increase of the preferred stock from \$5,000,000 to \$7,000,000. and the common from \$5,038,800 to \$8,000,000.

The financial plan calls for a common stock dividend of 20 per cent.; the sale of \$1,500,000 common stock at par to common stockholders, and the sale of \$2,000,000 preferred and \$500,000 common at par to preferred stockholders. It is understood that the sale of the additional stock has been underwritten.

RETURNS TO ADVERTISING.

E. K. Leach Leaves Oakland Sales Company for Philadelphia Evening Telegraph.

E. K. Leach, who was for some time general manager of the Commercial Car Journal, pub-

lished in Philadelphia, before becoming branch manager of the Oakland Motor Company in that city, has resigned the latter position to take that of advertising manager for the Philadelphia Evening Telegraph. His success as a salesman has been such as to win him a large number of new friends in the industry, and he will carry with him to his new position their best wishes for the future.

It is said that "once a newspaper man, always a newspaper man", and this appears to be true in Mr. Leach's case, since he was formerly for a number of years on the advertising staff of the Philadelphia North American. He also was interested for a time in co-operative and educational campaigns to interest national advertisers in dailies.

MARION RECEIVERSHIP.

Financial Affairs of the Company Have Been Adjusted Satisfactorily.

It is announced from Indianapolis, Ind., that the receivership, under which the Marion Motor Car Company of that city had been working since Nov. 3, 1913, was lifted by order of the court Jan. 24. It was stated at the time the company was placed in the hands of a receiver that the move was merely a protective one, and it is understood that the financial affairs have now been adjusted to the satisfaction of all concerned.

Two new men have been added to the company, these being H. J. Hayes of Detroit and Isaac Kinsey of Toledo, O. Mr. Kinsey will be chairman of the board of directors, which will include the following officers: President, J. I. Handley; vice president, H. J. Hayes; treasurer, J. M. Edsall; secretary, James E. Kepperley. In speaking of the recent court action, President Handley said:

This means that the Marion company will go ahead on a broader basis than ever before. Evidence of the regard in which the Marion is held by dealers and owners is reflected by the fact that our organization was held intact during the receivership. Naturally, we are well pleased with the outcome. We are all hoping that we will have no more floods in Indianapolis, for, as a matter of fact, the company's temporary embarrassment was very largely due to the floods of last March, which resulted in not only great financial loss at the time, but almost entirely disabled our manufacturing organization right at the height of the spring season. This made us over late in finishing our 1913 production, and correspondingly late in starting deliveries of our present models.

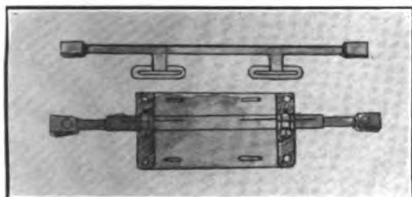
The J. I. Case Threshing Machine Company, Racine, Wis., maker of the Case car, will add 4000 workmen as fast as they can be secured, according to advices from that city.

NEW ACCESSORIES FOR THE MOTORIST.

LEE LICENSE HOLDER.

Includes Truss Rod to Prevent Vibration.

The Wm. O. Lee Company, Port Huron, Mich., is marketing the Lee lamp truss rod and license holder. It



is made in two styles, the No. 1 being designed for used cars and the second a special for automobile manufacturers. The former is adjustable, rods sliding into either side of the holder proper, and being locked by a clamp having a locking bolt. This permits the use of the design on different machines.

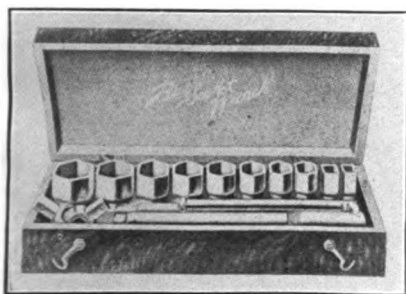
The device is fitted by slipping the ends of the rods over the lamp bracket, suitable eyes being provided. The clamping members are then secured. The maker states that the parts will not work loose, and that the truss will prevent vibration of the lamps, as the brackets are held in a rigid position. Means are also included for securing the number plate. The lamp truss rod and number plate holder is constructed of high grade material and is nicely finished.

RAY SOCKET WRENCH.

Equipment Includes 30 Steel Sockets, Extension, Etc.

The Ray socket wrench is manufactured by the Packer Auto Specialty Company, Chicago, for which Ralph Walcott, 1790 Broadway, New York City, is distributor. The maker states that the wrench will fit every nut and bolt on a car, and may be utilized in places difficult of access with the conventional tool. The wrench proper is sturdily constructed and when utilized with the universal joint provided with each outfit, it is claimed that work may be accomplished at any angle up to 90 degrees.

The complete equipment includes, in addition to the wrench, which is nickelled and highly polished, a long

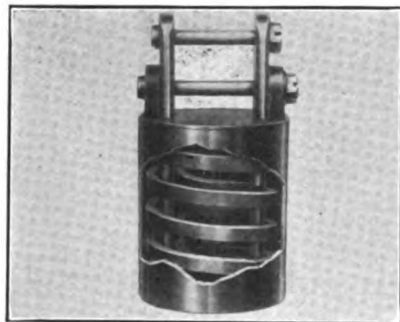


extension bar, two short extension bars, one large and one small screw driver bit, one universal joint, one four-inch spark plug socket and 30 case hardened cold drawn steel sockets. These are graduated in sizes and fully guaranteed. This equipment comes in a wooden case, and the maker states that it will perform a variety of work as well as eliminate the necessity of carrying a large number of conventional tools. The company also manufactures a small set which differs from the larger member in that 11 sockets are provided in addition to the spark plug member. The smaller outfit comes either in a leather case or an oak box.

HARTFORD CUSHION SPRING.

Principle Involves Use of Double Spring.

The Hartford cushion spring is manufactured by the Hartford Suspension Company, Jersey City, and the maker states that it is not a shock absorber, but a spring construction, which makes easy riding over moderately rough or other roads where the usual spring would cause discomfort. The Hartford design comprises a pair of double-acting



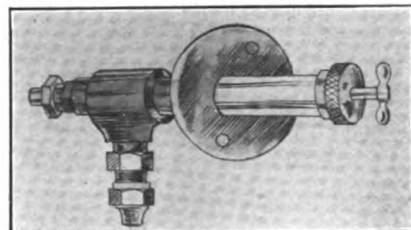
spiral springs which are attached to the rear shackles, capable of absorbing vibrations not taken care of by the usual shock absorbers.

The Hartford design consists of a spring within a spring, the larger or quick acting member moving freely up and down as the automobile spring expands and contracts. The inner spring serves as an auxiliary member to the other and is slower in its action. The two operate as compression members until a certain point is reached on the return, when it is held that a perfectly easy movement, free from abruptness, is obtained. The components of the cushion spring are housed in a neat metal casing and being compact the design does not detract from the appearance of the car. They are made in five models, including a special design for model T Ford machines, the types varying only in their carrying capacity. They are sold under a guarantee, and it is stated that they can be attached in 30 minutes. The maker of the Hartford cushion springs states that great care has been taken to incorporate only the finest grade of steel.

ZERO PUMP PRIMER.

Mixes Air and Gas for Starting a Motor When Cold.

The Zero pump primer is marketed by the Ideal Brass Works, Tenth street and Canal, Indianapolis, Ind.,



is attached to the dash, and the maker states that it automatically mixes the proper proportions of fuel and air for starting a cold motor. It is connected to main line of supply and the fuel is drawn into the mixing chamber or body of the pump, by the outward stroke of the plunger.

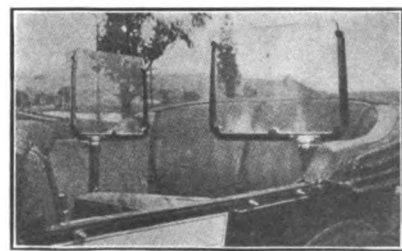
The downward stroke injects a small spray of fuel and air into the intake manifold above the carburetor, and the maker states that the mixture will ignite easily. The device is provided with an automatic needle valve for opening and closing the line when the plunger is operated.

CLARK WINDSHIELD.

Is Fitted to Tonneau and Is Adjustable as Desired.

The Clark adjustable tonneau windshield is manufactured by A. N. Clark & Son, Plainville, Conn., and, as the name implies, is designed to protect the occupants of the rear seats from draughts, rain, etc. One of its qualities is that it may be adjusted as desired, and another feature is that it may be folded when its service is not required, as in warm weather. It is made with a variety of bases to fit any car, and is attached to the seat under the cushion, coming up between the seat arm and the cushion. One windshield is used on either side of the car.

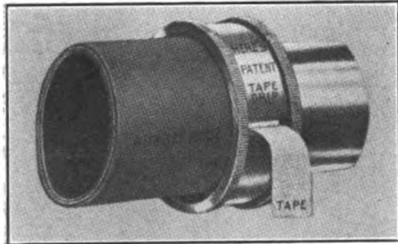
The Clark design is made of aluminum, finished in black, and is not only light, but is substantially constructed. It is pointed out that its use does not interfere with the exit or entrance of passengers, and that communication with the occupants of the front seats is not interfered with.



HERZ TAPE GRIP RING.

Automatically Winds Tape on Hose by Friction Principle.

The Herz patent tape grip ring, manufactured by Herz & Co., 245 West 55th street, New York City, is



a coupling having a metal rim with raised knurled edges, the rim being provided with a slot on one side through which ordinary tape is drawn in when rotated by hand. The rim has an inside flange, permitting the end of the hose to slide against it. In making the coupling the tape grip ring is slipped over the hose and the tape inserted in the slot. By rotating the ring the tape is drawn into the slot, and further movement results in the tape coiling itself upon the rubber of the hose, making a tight joint. This is due to the friction between the hose and the tape being greater than that between the tape and the ring.

NYCO TWO-SYSTEM SWITCH.

Provides Two Circuits on One Kick Switch.

The Nyco two-system switch will appeal to owners of Ford and other makes of cars utilizing a master vibrator in connection with the conventional induction coils for ignition, in that the regular coil may be employed without removing the means utilized for shunting the primary circuit. With the Nyco the switch or controller may be moved to the vibrator side or to the coil side as desired. In the latter position the regular coil is brought into service. This is a distinct advantage, in that it permits the operator to use the vibrators to locate a missing or faulty cylinder. The lever or control member is of the conventional kick type and is operated easily by a simple movement of the foot.

The device is very compact and is constructed with the same care and high grade material for which the products of the maker, the New York



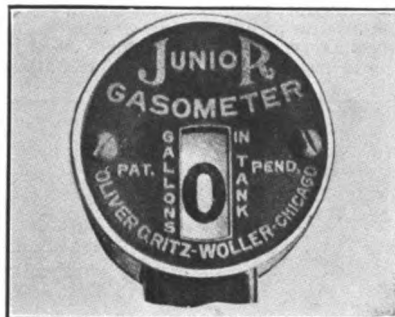
Coil Company, 340 Pearl street, New York City, are noted. It is supplied with flexible wire connections of different colors and of proper length to connect to the master vibrator and those of the coil. The wiring of the car is not changed, and the Nyco may be fitted to the dash and wired in 10 minutes by the most inexperienced person. It is moderately priced and is guaranteed.

JUNIOR GASOMETER.

Dash Gauge Indicating Supply of Fuel in the Tank.

Among the numerous devices for indicating the supply of fuel in the gasoline tank is the Junior Gasometer, made by Oliver C. Ritz-Woller, 538 Clark street, Chicago, who also manufactures the Ritz Gasometer designed for large machines. The device is a compact, circular, dial like member, mounted on the dash, and the principle employed is that of a pneumatic control of the indicator.

The Junior is a smaller form, but operates on the same principle as the more expensive indicator, and the amount of fuel on hand is denoted by large figures. In the accompanying illustration zero is shown, denoting



that the tank is empty, and it will be noted the figure is easily discernable.

The maker states that the Gasometer will indicate every minute and correctly the amount of fuel in the container, whether the car is travelling up hill or down, over rough or smooth roads, as the operation of the device is not affected by the movement of the gasoline in the tank.

It is also claimed that a novice can install it on a car in a very short time. It is adaptable to both gravity and pressure feed systems, but when the latter is employed the price of the Gasometer is slightly increased.

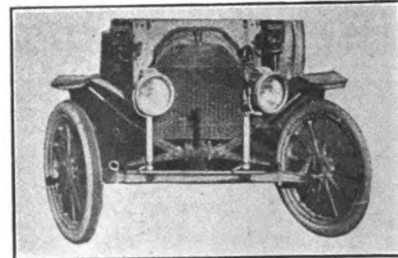
BUYERS' GUIDE.

Readers of The Automobile Journal in need of anything in accessories, equipment, supplies or fittings should consult the Classified Buyers' Guide, found elsewhere in this issue. It provides a handy reference, in that the articles above referred to are listed alphabetically, and the names and street addresses of the makers are given, also their branches or service stations. The concerns listed therein are reliable and are worthy of your patronage.

SAFETY FIRST HEADLIGHTS.

Automatically Turn with Front Wheels, Eliminating Glare.

The Headlight Support Company, Detroit, is manufacturing the Safety First turning headlights for which a



number of practical advantages are claimed. They are of the moving type, being actuated by connections to the tierod of the machine so that when the steering wheel is rotated the headlights are turned in the same direction as the front wheels. The supports are fastened to the frame in much the same manner as the conventional method of attachment.

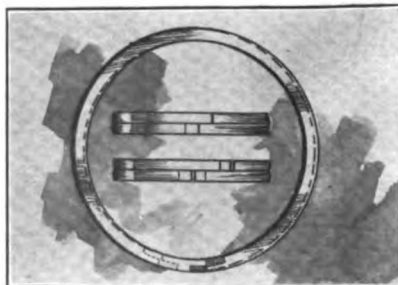
The particular advantage emphasized by the Safety First device is that in rounding curves and turning corners the road is lighted on the side not illuminated by fixed headlights. Another feature claimed is that in meeting an approaching car the lights may be so turned as to eliminate the glaring effect.

DUPLEX PISTON RING.

Maker Claims Oil and Gas Tight Features.

The Duplex piston ring is manufactured by M. L. Dunham, 140 West 52nd street, New York City, and the maker states that when fitted to a piston the gas cannot pass the rings; that smoking is eliminated and that the efficiency of the motor is improved. One of the qualities claimed for the Duplex is that wear does not affect the joints. It is also stated that it remains sealed at all times.

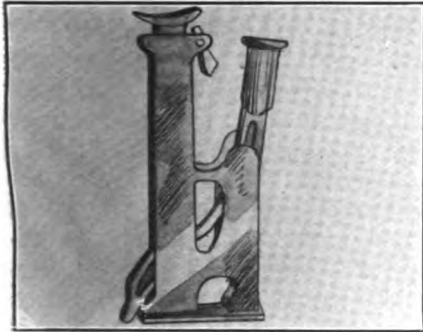
It is further held that the tension of the ring is balanced or even, and that its gas tight feature is obtained with a very light pressure. When in service the ring has an outward tension, also a double spiral tension; that is, the free ends not only exert a force outwardly, but expand radially in opposite directions around the cylinder wall, and will fit themselves to a worn or new cylinder.



MODEL A CAM JACK.

Has Long Handle and Is Quick Acting.

The Cam Jack is the product of the Four-Wheel Auto-Jack Company, 146 Madison avenue, Reading, Penn.,

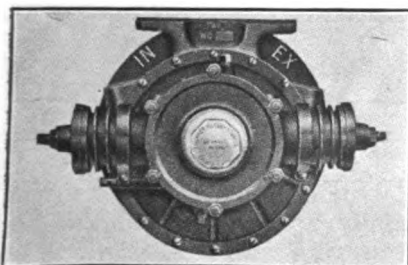


and is made in two models, that illustrated being the A design for light cars weighing 2000 pounds and under. One of the qualities of the jack is that a long handle permits of placing it under the car without stooping, and a single push performs the work of lifting. It has an instantaneous adjustment to varying axle heights, making for economy in time. An automatic stop is incorporated, locking the lever at the end of the lift, and a quick drop is obtained by throwing back a pawl and stepping on the handle.

THURBER AIR STARTER.

Air Pump and Starter Combined in a Unit Construction.

The Thurber Rotary Starter Company, 685 Atwater street, Detroit, has brought out a new model Thurber rotary starter, which is operated by compressed air. The pump employed is of the high pressure type and one of its features is that it is built with the starter, a unit construction. The starter is mounted at the front of the machine, on a cross frame member, and being very compact, does not detract from the appearance of the car. The pump is held to be very efficient in its action and makes it possible to carry a pressure of 250 pounds at all times. The air is stored in a drawn steel tank located out of sight beneath the body. The system includes a gauge mounted on the dash, which indicates the supply of air in the tank, and provision is also made in the dash plate valve for an outlet for connecting a hose for the purpose of inflating tires, cleaning, etc.



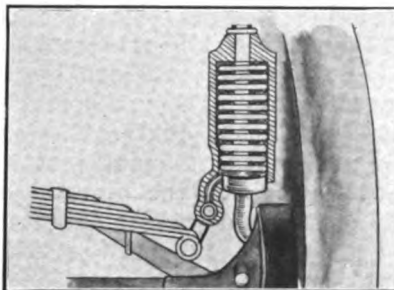
Two control units are mounted in the floor or toeboard, these comprising the starting button and pump control pedal. The gasoline motor is started by depressing the button, which actuates a rod connected to a double control valve, permitting air to flow from the tank to the starter which, being attached to the crankshaft, spins the last named member. Upon the engine starting under its own power a clutch disengages the starter, which remains idle until another start is desired. The tank is refilled by depressing the pump control pedal.

K-W ROAD SMOOTHERS.

Designed Especially for Model T Ford Automobiles.

The K-W Ignition Company, Cleveland, O., is manufacturing the K-W road smoothers for the model T Ford automobile and the company states that they are not shock absorbers. It is held that the tires may be pumped up to the maximum pressure without affecting the resiliency, as the K-W has a cushion effect, taking up vibration, shocks, etc.

The smoothers come four to a set, being utilized both front and rear, and, as will be noted by an accompanying illustration, comprise a simple arrangement of a spring hanger



with an additional coil spring which is substituted for the regular Ford spring hangers. The K-W springs support the regular members and it is held that they are anti-synchronous with them, but do not retard their action.

It is stated that the smoothers may be attached without drilling or any other alterations. All that is necessary is to relieve the springs of the weight of the car, displace the spring hangers, place the smoother in position and shackle the end of the main spring to the K-W device. They are guaranteed for one year.

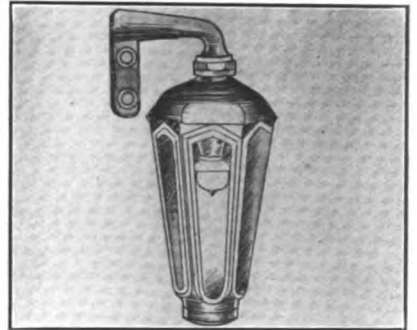
NEW ACCESSORIES.

The Automobile Journal invites manufacturers, distributors and agents to co-operate in presenting to its readers new accessories, equipment, etc. The forwarding of suitable illustrations and data, and publishing of same, does not place the contributor under any obligations. The editor of this department, however, reserves the right to discuss the practicability of the article submitted. The name of the manufacturer and street address, should accompany all data, also retail price.

HALL PILLAR LAMP.

Illuminates Steps or Running Board of Enclosed Car.

The C. M. Hall Lamp Company, Detroit, is marketing the Hall "223" pillar lamp, which is a handsome de-



sign of the electric type. It is employed both for a side and step light, as a reflector is incorporated over the bulb, which throws the rays downward on the step or running board to be illuminated.

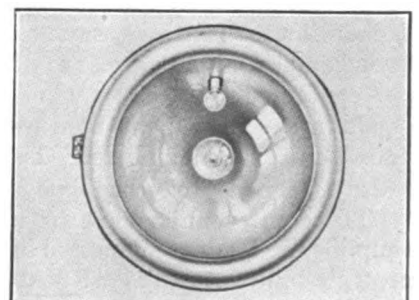
The lamp is designed for limousine bodies, and it is stated that the rays do not shine in or blind the eyes of passengers entering the car. The lamp has a hollow bracket through which the wires are passed into the body and to the main lighting circuit.

GRAY & DAVIS DIMMER.

Headlight Is Equipped with a Large and a Small Bulb.

In many cities the ordinances prohibit the use of headlights or lamps which blind those approaching the machine. This necessitates the turning out of the headlights and utilizing the side lamps. To comply with the laws and to provide both the side and headlight in one unit, Gray & Davis, Inc., Boston, Mass., has brought out a dimming attachment.

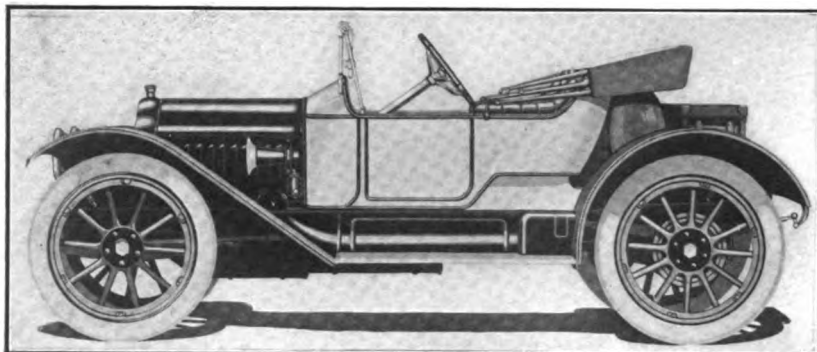
It comprises a four candlepower bulb mounted at the top of the reflector, and in such manner that it does not impair the efficiency of the centre or regulation bulb. When the lighting switch is turned to "All On" or "Headlights and Rear", the small bulb remains unlighted, but when the switch is moved to the "Side and Rear On", the small lamp is lighted and the larger member extinguished. This attachment, which is provided at a slight extra cost, is also of value when driving in the country.



MANY REFINEMENTS IN 1914 WHITE LINE.

BELIEVING that the interests of its customers are best served by refining principles indorsed by sound engineering practise and main-

shield, convenient to the operator, and comprise a starting and lighting switch, and the battery indicator. The White motor-generator is a com-



White Thirty Roadster, Having a Long Stroke Motor, Four-Speed Gearset, Electric Lighting and Motor Starting, Etc.

taining the high standards characteristic of its product in the past, the White Company, Cleveland, O., maker of the White cars, announces the retention in 1914 of all three chassis. These are the Thirty and Forty, four-cylinder designs, and the Sixty, a six-cylinder model. A number of improvements are noted in the chassis, these being in keeping with the policy of the company to add conveniences as soon as they are developed and perfected. The prices remain unchanged, but the improvements give each model a higher value, and this applies both to the chassis and body.

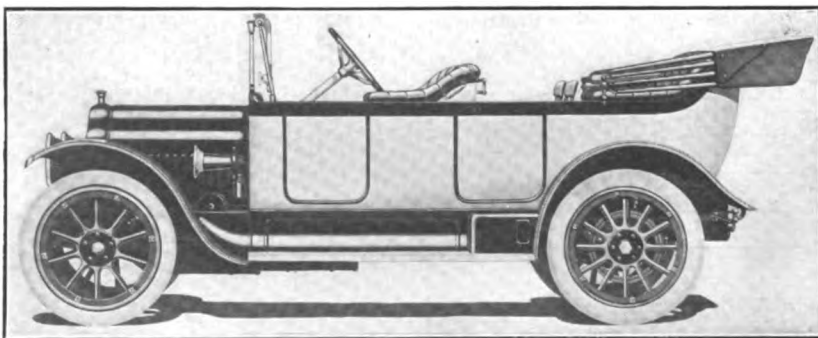
Particularly noticeable is the use of a molding around the top of the bodies of the Sixty models, which adds to their attractiveness. The enclosed types have been redesigned, the shape of the roofs being more graceful, while the body trimmings represent the highest development of the coach maker's art. The new touring bodies are built on long, straight lines with a full curved rear, and the dash has no cowl. Instead, the top lines of the hood and body extend in an almost unbroken line. All fittings, such as door handles, hinges, etc., are of the concealed type. The windshield presents a neat appearance and is supported by rods attached to the body.

The control units have been centralized and simplified. They are mounted in an aluminum receptacle built into the dash just below the wind-

compact unit, and one of its qualities is that stalling of the engine in service is automatically prevented by the arrangement of the system as, upon the speed of the engine falling to a predetermined point, the electric motor becomes operative, supplying energy until the engine operates under its own power. The change from a motor to a generator is performed automatically. This automatic cranking feature is a distinct advantage when operating in crowded traf-

fic. The headlights are of the double-bulb construction, a miniature lamp supplying the dimming feature and eliminating the conventional side lamps.

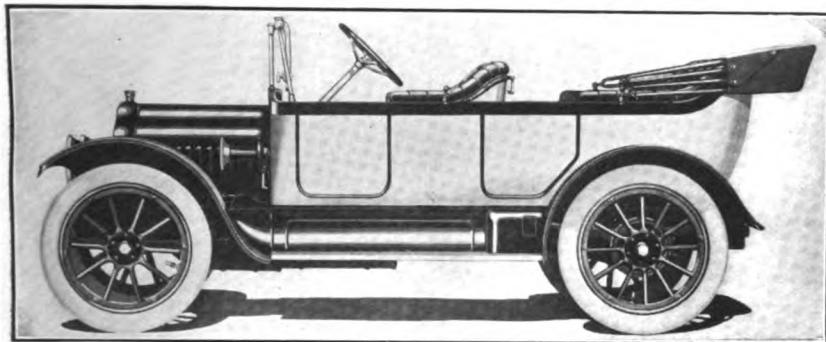
The White line of enclosed cars will appeal to those who appreciate the luxury and comfort provided by rich fabrics and deep upholstery. Coupe bodies are fitted to the Thirty, Forty and Sixty. The coupes are of the colonial type with sloping roof, and the design is well balanced by the graceful outline of the rear compartment, which permits ample storage space. The seating capacity provides for three persons, two on the rear seat and one in front at the right. The interior fittings include dome light, Pullman reading lamps, coat hooks, umbrella holder, ventilator, bouquet case, toilet case, hat and parcel rack, cigar lighter and those conveniences in keeping



The Chassis of the White Forty Has Been Lengthened to 124 Inches and the Stroke of the Motor Increased.

with the enclosed type of body. The limousine bodies are beautifully upholstered and the appointments are in keeping with the design. The

driver is enclosed, separated from the passengers by a glass partition, which may be lowered into the wall to provide a unit interior.



The White Thirty Touring Car for 1914 Is Noticeable for a Number of Improvements and Refinements.

Among the mechanical improvements is the adoption of a single plate clutch running in oil, instead of the leather faced cone used heretofore. The change was not due to any dissatisfaction with the cone, but was made owing to the superiority of the White design, which is held to operate with remarkable smoothness.

Although the cooling system has always been efficient under the severest kinds of service, a new design of water passage from the top of the water jackets to the radiator is utilized. This water head combines the outlet cover plate and pipe. The honeycomb radiator is continued but is of larger capacity.

The White motors are cast en bloc and are in the long stroke class. The dimensions of the Forty have been increased, the bore being 4.25 inches and the strokes 6.375. The Thirty has a bore of 3.75 inches and stroke of 5.125, while the cylinder dimensions of the Sixty are 4.25 by 5.75.

Carburetion is by a White carburetor, water jacketed and connected to take the heat of the exhaust. The single system of ignition is employed, a high-tension magneto. Cooling is by a gear driven centrifugal pump, aided by an adjustable belt driven fan. Lubrication system is a combination force feed and splash. There is a direct feed to the main bearings, and each connecting rod is lubricated through oilways, drilled through the crankshaft. The oil is circulated by a gear driven pump, actuated by the camshaft. The reservoir is secured

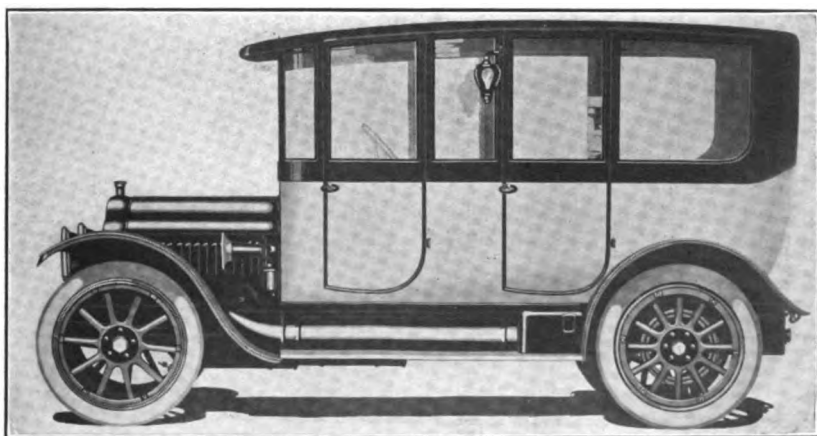
to the right side of the cylinders, and there is an oil level valve on the under side of the crankcase, which is operated by a pull rod fastened under the radiator. The supply of lubricant is adjustable at the pump and a sight feed is located on the dash.

The White gearset provides four forward speeds as in the past. It is of the selective type, the gears of heat treated chrome nickel steel, and all shafts are suspended in annular ball bearings. Direct drive is the third speed, the fourth being a step-up. Drive is through a shaft of ample size, having two universal, and one telescopic, joints to the rear axle, which is a

White design. Two sets of brakes are fitted, the service being of the external contracting type, operating by pedal, and the emergency metal-to-metal, internal expanding.

The front axle is a one-piece drop forged I beam section type, of high carbon steel, heat treated. The rear axle is a White design. The differential and axle sleeves are supported by a heavy truss extending under the differential housing, and all gears are accessible through a removable cover. The live axles are of chrome vanadium steel, heat treated. The brake band supporting arms are integral with the axle sleeves.

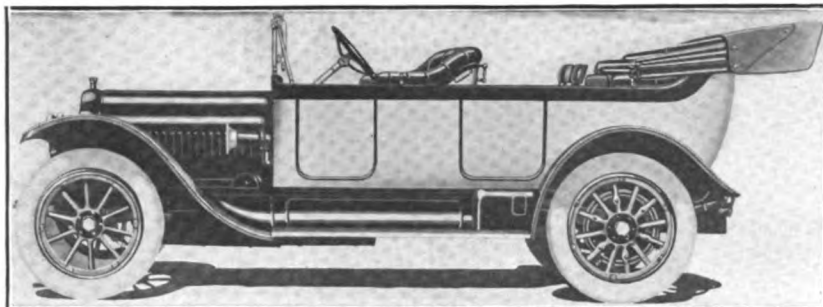
The front springs are semi-elliptic and rear three-quarter elliptic. The company calls attention to the easy riding qualities of its springs,



The White Berline Is Not Only a Handsome Design, but Is Richly Appointed—Among the New Features Is a Step Illuminating Pillar Lamp.

which are of a special steel alloy. The wheels have unusually large hubs and spokes, and annular bearings are utilized. Demountable rims,

with one extra member, are standard equipment on all models. The tire sizes are as follows: Thirty, 34 by four; Forty, 36 by 4.5; Sixty, 37 by



White Six-Cylinder, Seven-Passenger Touring Car—A Single-Plate Clutch Replaces the Cone, and the Cooling System Has Been Improved.

five. The wheelbase of the Forty chassis has been increased from 120 inches to 124. That of the Thirty is 110 inches. The six-cylinder models have a wheelbase of 132 inches. The driver is placed at the left in all models. As in the past the White company thoroughly protects the mechanism of the chassis, the components of which are very accessible for inspection and adjustment.

ENTRIES NOW NUMBER SIX.

Anel Is Withdrawn in Favor of Two Centipedes with 16 Valves Each.

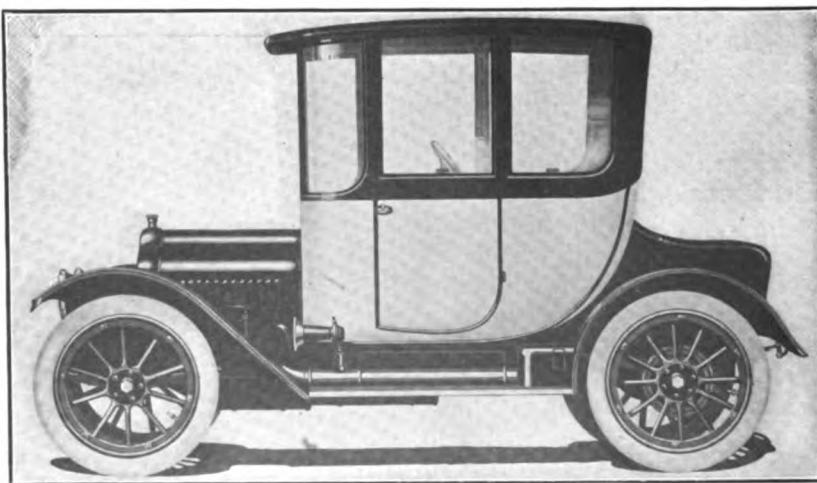
It begins to look as if the fourth international sweepstake, or 500-mile, race on the Indianapolis motor speedway, Memorial Day, would bring out a number of new racing models. Thus far, but six official entries have been made, and of these the two Stutz cars are about the only names that appear at all familiar. There is also a Gray Fox, and there was a Fox machine entered last year. The others are designated as the Beaver Bullet and two Centipedes. The Anel has been withdrawn and one of the Centipedes has been entered in its stead.

These Centipedes are entirely new, and, while complete details are lacking as yet, it is anticipated that they will present some novel features. The motor dimensions are given as 5.1-inch bore, 5.5-inch stroke, and 449.43 cubic inches piston displacement. The last named figure would in-

dicate a four-cylinder engine, but it is stated that the name of the car is taken from the fact that the motor has 16 overhead valves. Robert Burman will drive one of the Centipedes, but the driver for the other has not been nominated.

From Europe comes the information that no less than seven foreign drivers and cars may be expected, as follows: Alfred Guyot, Delage; Jules Goux, Peugeot; Georges Boillot, Peugeot; Jean Chassagne, Sunbeam; Arthur Duray, Peugeot; Felice Nazzaro, Nazzaro, and Christiaens, Excelsior. These cars represent France, England, Italy and Belgium. Other American and foreign made machines are expected in early announcements.

In recent descriptions of the new Continental Baby, model N, engine, made by the Continental Motor Manufacturing Company, Detroit, a typographical error made it appear that the valves in this motor were only 1.0625 inches in diameter. As a matter of fact these valves, in both the model N and the Baby Six, model 6-N, are held to be exceptionally large for the cylinder measurements, being 1.75 inches. The bore of these engines is 3.5 inches and the stroke five. The company states that this large valve equipment is in accordance with the latest practise, as evolved by automobile engineers in this country and



The White Thirty Three-Passenger Coupe Has Attractive Lines and the Appointments Are Most Complete.

abroad, and that it secures for the motor a much freer action and considerably raises its effective output at high speeds.

NOVEMBER IMPORTS AND EXPORTS.

FOR the first time in a number of years the monthly report of the Department of Commerce for November shows a decrease in the valuation of automobiles shipped abroad for the month over the corresponding month for the previous year. In number of cars, there was a slight increase, and if the valuation of parts be added to that of the machines, another increase appears.

The number and valuation of imports for the month shows a slight increase over the month of October, which was the first under the so-called Underwood tariff. This feature of the report is unusually interesting, in view of the application of the new tariff, because it would appear that the average price of the cars coming

November, 1912, was \$1050, as against \$982 for the same month in 1913. The 31 trucks mentioned above were valued at \$56,176, and the 64 at \$105,501. The detailed figures for the month of November and for the first 11 months of the respective years are given in the accompanying table.

UNIQUE TRUCK CONVENTION.

Federal Dealers Give One-Act Play and Organize a National Association.

Some 50 dealers representing Federal trucks, made by the Federal Motor Truck Company, De-

IMPORTS.										
	November			First 11 Months						
	1912	1913		1911		1912		1913		
	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value
France	42	\$108,356	16	\$40,708	294	\$661,956	426	\$1,022,995	174	\$410,980
Germany	11	28,206	2	5,200	147	322,153	56	133,337	80	211,131
Italy	19	25,952	6	6,426	118	182,085	99	155,503	80	143,799
United Kingdom	7	17,670	6	15,684	150	352,683	122	296,253	48	144,677
Other countries	8	18,167	7	9,755	160	352,537	78	163,847	72	150,631
Totals.....	87	\$198,351	37	\$77,773	869	\$1,871,414	781	\$1,771,935	454	\$1,061,218
Parts (except tires).....	..	21,863	..	67,420	....	297,442	....	263,125	....	309,501
Grand totals.....	..	\$220,214	..	\$145,193	....	\$2,168,856	....	\$2,035,060	....	\$1,370,669
EXPORTS.										
France	83	\$62,727	87	\$63,641	385	\$425,714	668	\$502,040	801	\$609,731
Germany	46	32,197	69	35,827	106	118,710	438	348,398	959	811,293
Italy	13	16,279	25	17,899	171	194,784	267	240,715	302	259,079
United Kingdom	164	139,222	321	297,771	3,173	2,741,524	4,371	3,302,918	4,504	3,482,301
Other Europe	99	80,086	121	80,246	705	650,642	1,439	1,178,847	1,686	1,435,495
Canada	471	550,362	266	396,753	4,556	5,137,685	6,864	8,255,134	5,824	7,870,086
Mexico	35	51,494	14	24,161	262	432,316	233	372,086	213	386,894
West Indies and Bermuda	43	48,114	50	48,058	263	303,434	316	331,230	455	445,596
South America	273	346,995	203	218,930	909	1,131,182	1,859	2,164,983	2,474	2,773,140
British Oceania	263	265,820	295	269,941	2,041	1,871,716	3,112	2,852,005	3,069	2,855,330
Asia and other Oceania..	148	154,035	229	244,120	742	719,083	1,469	1,464,358	2,230	2,218,897
Other countries	51	59,735	91	84,880	247	264,141	671	630,463	1,983	1,729,465
Totals.....	1,689	\$1,807,066	1,771	\$1,782,227	13,560	\$13,990,931	21,707	\$21,643,177	24,500	\$24,877,307
Parts (not including engines and tires).....	..	300,655	....	552,812	....	2,951,188	....	4,236,765	....	5,730,074
Grand totals .....	..	\$2,107,721	....	\$2,335,039	....	\$16,942,119	....	\$25,879,942	....	\$30,607,381

into this country from abroad was growing slightly less.

During October there were imported into this country 29 cars, valued at \$74,646, while during November, there were 37 cars valued at \$77,773. This gives an average valuation of \$2574 for the former month and \$2102 for the latter. The average valuation of cars coming into this country in 1911 was \$2153; in 1912, \$2268, and for 1913, previous to the application of the new law, \$2332.

The export figures show that of the total of 1771 machines shipped abroad in November, 1913, 64 were commercial vehicles and 1707 pleasure cars, as against 31 trucks and 1658 pleasure cars during November, 1912. The average valuation of the pleasure cars shipped abroad in No-

troit, attended the annual convention at the factory last month. A feature of some little interest was the annual banquet at the Hotel Cadillac, during which a one-act play, written expressly for the occasion, was enacted by dealers and factory representatives, the plot being a burlesque of the eccentricities of both dealers and factory officials.

At the conclusion of the dinner the National Federal Dealers' Association was organized with the following officers: President, Allan Baker, St. Louis, Mo.; vice president, William L. Hughson, San Francisco; secretary, C. T. Chenevert, assistant sales manager, with headquarters in New York City, and treasurer, H. S. Dunlavy, Chicago.

WITH THE MOTORING INTERESTS ABROAD.

German, French, British and Belgian Manufacturers Co-Operate in Arranging Show Plans---Analysis of Hornsted's New Records---Other Foreign News.

EUROPEAN motor car manufacturers have been giving the annual show question some very earnest thought during the past few years, and it would appear that they have evolved an entirely new plan with respect to holding such exhibitions in Germany, France, Great Britain and Belgium. It is stated that the national organizations of manufacturers in these four countries have banded themselves together under the name of the International Union of Automobile Manufacturers for the purpose of regulating the shows held in Berlin, Paris, London and Brussels, and that a meeting will be held in the near future to put these plans into execution.

It will be remembered that the French manufacturers abandoned the Paris Salon for a time, this annual display having been revived in 1912. The German manufacturers abandoned the annual Berlin show in 1911, and none has been held since. The Brussels show, which was held last month, has not been regarded as of quite the same importance as the others, and the annual Olympia show in London is practically the only

be held early in December, instead of January as heretofore. This order has been determined upon because the French and British makers already had engaged their buildings for the dates named.

In each city the same plan will be followed in the matter of drawing for space. Locations will be determined by lot, manufacturers representing foreign countries having equal rights with those of the home country, providing they have been represented in three previous shows in that city. If this requirement has not been fulfilled, then foreign firms draw immediately after the home manufacturers in their respective classes.

HORNSTED'S WORLD'S RECORDS.

New British Marks Do Not Exceed Those Made by Cars in This Country.

Some little interest attaches to the new world's straightaway records recently set up by Hornsted of Great Britain in a Benz car on the Brooklands track at Weybridge, England. In various quarters these have been hailed as indicating the fastest speed yet attained by a motor car. A little study of the British world's records and those accepted by the American Automobile Association should be sufficient to convince the investigator that Robert Burman has not been robbed of his honors in this field.

Hornsted drove his Benz car over a measured kilometer on the Brooklands track in one direction in 29.62, and in the reverse direction in 31.19. Records are not accepted abroad unless the course is driven in both directions, and then only the mean time is taken. In this case the record has been accepted as 30.405. It may be explained that this was for a standing start. Burman drove his Blitzen Benz over a measured kilometer on the beach at Daytona, Fla., April 23, 1911, in 15.88, but his was a flying start. It is only on the score that Hornsted's mark was for a standing start that it can be recognized generally as a world's record.

Hornsted drove a measured half-mile, also from

COMPARISON OF BRITISH AND AMERICAN WORLD'S RECORDS.

	Kilo	.5-mile	1 mile	2 miles	5 miles
Hornsted, Benz, Brooklands	29.62	25.49	.....	57.99	2:35.00
Burman, Benz, Daytona	15.88	.....	25.40	51.28	.....
Hemery, Darracq, Daytona .....	.....	.....	.....	.....	2:34.00
Burman, Benz, Indianapolis	21.40	16.80	35.35	.....	.....
Bragg, Fiat, Los Angeles .....	.....	.....	.....	1:15.96	.....

one of the four which has retained its position as an international exhibition from the beginning.

Apparently, the International Union of Automobile Manufacturers is seeking to reduce the expense attendant upon exploiting the season's models in this manner. And to this end, it is proposed to hold the international displays in the four countries named early in the season and closely enough together to enable the use of the same cars and chassis for all four exhibitions.

Thus the 1914 Berlin show will be held in October, probably Oct. 1-10, to be followed Oct. 16-26 by the Paris Salon. The Olympia show will be opened Nov. 6, and it originally was the intention of the Society of Motor Manufacturers & Traders to extend the show period to 10 days instead of a week. This plan may be changed, but it is anticipated that the Brussels event will

a standing start, in one direction in 25.49, and in the other in 25.60, with a mean time of 25.545. Burman drove the Blitzen Benz a measured half-mile on the Indianapolis speedway, May 29, 1911, in 16.80, but this was from a flying start.

However, Hornsted claims two world's straightaway records made from a flying start. He covered a measured two miles on Brooklands track in 57.99, but this was nearly six seconds slower than the 51.28 made by Burman at Daytona, Fla., April 23, 1911. It does exceed the flying two miles made by Caleb Bragg in a Fiat on the Los Angeles motordrome, April 13, 1910. Bragg's time was 1:15.96.

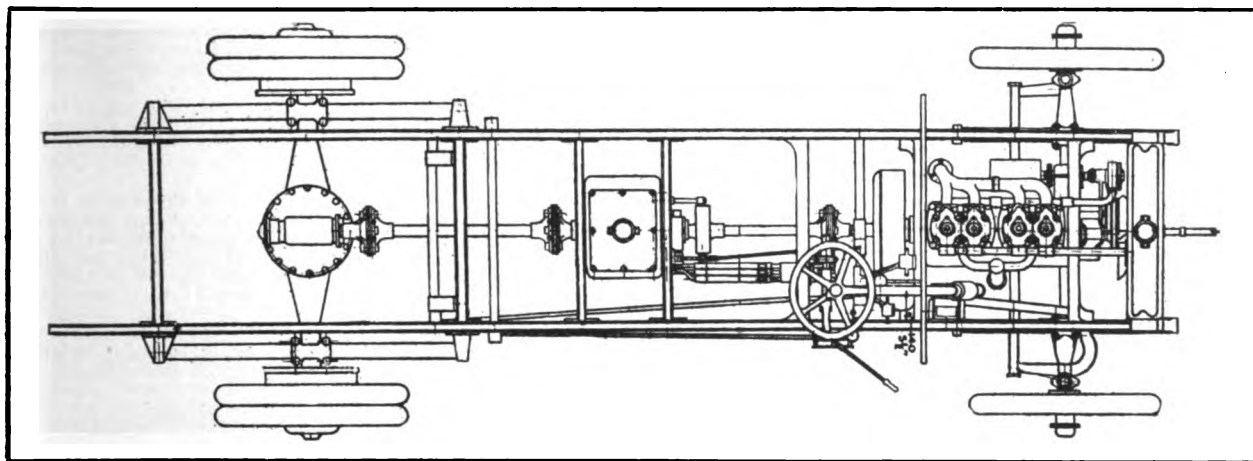
The other record claimed by Hornsted is for the flying five miles, held in this country by Victor Hemery in a Darracq, and made at Daytona, Fla., March 24, 1909. Hemery's time was 2:34.00, and Hornsted's 2:35.00.

The situation is set forth in a graphic way

in addition of three new models of Knight engined trucks brought out abroad. And it may be added, that it is expected that at least one American manufacturer will shortly announce a commercial vehicle utilizing this type of engine.

So far as is known, the Daimler Company, Coventry, England, was the first concern to utilize this type of engine in a motor business wagon. It brought out its first machine, rated at one-ton capacity, about a year ago, and, although it was expected that it would meet with a certain amount of prejudice, the year's results have been most satisfactory. Several Daimler-Knight omnibuses are running in London and other English cities, and several wagons have been working on all kinds of roads and in the hands of skilled and unskilled drivers.

The Daimler Company now announces two additional models, one of which is shown herewith. This is rated at two tons, and the other has



Two-Ton Daimler Truck Chassis, Equipped with Four-Cylinder Knight Engine and Worm Driven Rear Axle.

by the accompanying table. The only explanation lies in the supposition that Great Britain refuses to accept the marks made in the United States, although these have been recognized generally for several years. It seems decidedly evident that Hornsted has not yet travelled faster than any one else in a motor car.

KNIGHT ENGINED TRUCKS.

Daimler Company Adds Two More Models and Minerva Concern Enters the Field.

Because of the interest created in the Knight engine by the recent world's record test of the Moline-Knight motor, made by the Moline Automobile Company, East Moline, Ill., in the laboratory of the Automobile Club of America, New York City, a matter of timely notice is the

capacity of five. They are very much alike, with the exception of the engine size and the size of some of the other components. Both motors are of the four-cylinder type, the larger having bore of 110 mm and stroke of 150 (4.3 by 5.9 inches), and the smaller, 95 by 125 mm (3.7 by 4.7 inches). The former is rated at 30 horsepower and the latter at 22.4. Both machines are fitted with large diameter cone clutches, and the selective sliding gear transmissions afford four speeds forward and reverse. Final drive is by shaft, fitted with leather disc universal joints, to a worm driven rear axle.

The maker of the Minerva car in Belgium, which has been utilizing Knight engines in its pleasure car models for some time past, has also brought out a truck of 2.5 tons capacity, fitted with this type of motor. The engine is a four-cylinder unit, with 85 mm bore and 140 mm

stroke (3.3 by 5.5 inches), located in the cab. The transmission affords four forward speeds and reverse, and the final drive is by shaft to a worm driven rear axle of the overhead worm type.

RUNNING CARS ON POTATOES.

Great Britain Is Much Interested in Possibilities of Alcohol as Fuel.

It is now some years since the first suggestion was made that potatoes and like crops could be made to produce a fuel suitable for use in automobile engines, but the idea seems to have been revived with energy in Great Britain. The Autocar, a British motoring publication of prominence, has engaged Dr. W. R. Ormandy to conduct a series of tests utilizing alcohol as fuel, and it is stated that these already have resulted in showing that a half-and-half mixture of alcohol and benzol will work satisfactorily with ordinary gasoline engines and carburetors; that with slightly modified engines and carburetors this mixture may be used even more advantageously, and that with specially designed engines and carburetors alcohol alone could be used.

In a recent issue of The Autocar, Dr. Ormandy utilized considerable space in reviewing Bismarck's successful attempt to encourage the farmers of northeastern Germany in the production of potatoes on waste land, and their conversion into alcohol. Having established this enterprise the German government still further sought to foster the industry by offering bounties and encouraging the offering of prizes for the manufacture of motors for agricultural purposes designed to run on denatured alcohol, containing about 2.5 per cent. of benzol.

Dr. Ormandy's view of the situation is that German automobile manufacturers did not become interested in the project largely because more than half of the output was sold abroad, and an engine or a carburetor designed for the special conditions of their own home made fuel would have been useless outside their own borders. He states, however, that the government attempted to enforce the use of alcohol-benzol mixtures on the hackney automobile carriages in Berlin, but without notable success, although agricultural motors were constructed which used the fuel successfully.

Apparently, The Autocar and Dr. Ormandy are convinced of the possibilities of alcohol as a motor car fuel, and the series of tests is expected to reveal much additional information. It is conceded that the fuel problem is much more acute

in Great Britain and abroad than in this country. The Institution of Automobile Engineers in England has taken up the subject in an effort to learn exactly what steps must be taken in order to utilize alcohol successfully. At present, however, there is an excise tax on the production of alcohol, and motorists are strongly urged to seek its repeal.

NEWS NOTES FROM FOREIGN LANDS.

The Austrian Imperial Automobile Club's Alpine tour for 1914 will start from Vienna, June 11, and will occupy 10 days.

The Hungarian Imperial Automobile Club, Budapest, Hungary, is said to be organizing a competition for engine starting devices.

The Willys-Overland Company, Toledo, O., has secured an order through its London representative for an Overland car for the personal use of Prince Alfonse of Bavaria.

S. F. Bowser & Co., Fort Wayne, Ind., has been commissioned by King George of Great Britain to install one of its underground gasoline storage systems at the garage at Buckingham palace.

The technical committee of the Belgium Automobile Association is holding a public competition and test of lighting systems Feb. 9-11. Provision has been made for three classifications, electrical, acetylene and miscellaneous.

It would appear that the last record run between Sydney and Melbourne, Australia, had been run, since the police authorities have issued an order that no more attempts are to be made under pain of severe punishment.

It is stated that Prince Henry of Prussia is much interested in a revival of the Anglo-German reliability trial for the Prince Henry trophy some time during the present year. A meeting of the German Imperial Automobile Club was held recently to take up the matter.

A movement is on foot in Australia to construct in the vicinity of Sydney a motor speedway, along the lines of the Brooklands track at Weybridge, England. The proposed track will be 100 feet wide and 2.5 miles in circumference. Brooklands is about 2.75 miles to the lap.

Twenty-one entrants have filed their intention of competing in the Coupe de Tourisme endurance test, leaving Paris, Feb. 15, and covering 2000 miles of French roads. The event is open to small, light cars and cycle-cars only, and will prove a strenuous test of their capabilities, since they will be required to negotiate Alpine passes and Pyrenean gradients, with the equivalent of four passengers aboard.

Thirty-seven cars have been entered for the annual Tour de France reliability test, which will start from Paris, March 1. Unlike previous tests, runs will alternate with hill climbs and speed trials, these to be held in the vicinity of various large towns in order to give the provincials an opportunity to inspect the machines and learn of their possibilities. Toward the end there will be a 60-mile speed contest over the Le Mans course, utilized last year for the Grand Prix.

The following American cars were represented at the recent Northern England show at Manchester: Bedford Buick, Cadillac, Ford, Hupmobile, Overland and Seabrook R. M. C., the last named being the British term for the Regal. In addition there were several American made accessories, included among which were: Stewart speedometers, Bowser gasoline systems, Raybestos brake lining, Jones speedometers, Klaxon horns, Rushmore electric lighting systems, Vacuum Mobiloids, etc.

Early last year the Royal Automobile Club of Great Britain issued rules and regulations with regard to a trial of electric lighting equipment for motor cars which was to be held in competition for a cup to be presented by Country Life. The entry list remained open until Sept. 15, and the trial was to have taken place during October. Inquiry as to the result of the competition reveals the fact that no entries were received. This is somewhat surprising in view of the increasing interest in electric lighting among manufacturers and motorists in Great Britain.

HINTS FOR NEW CAR OWNERS.

Operation of Abbott-Detroit Lubricating System---Adjustment of Model 79 Overland Carburetor---Replacing Camshaft of Model T Ford Motor.

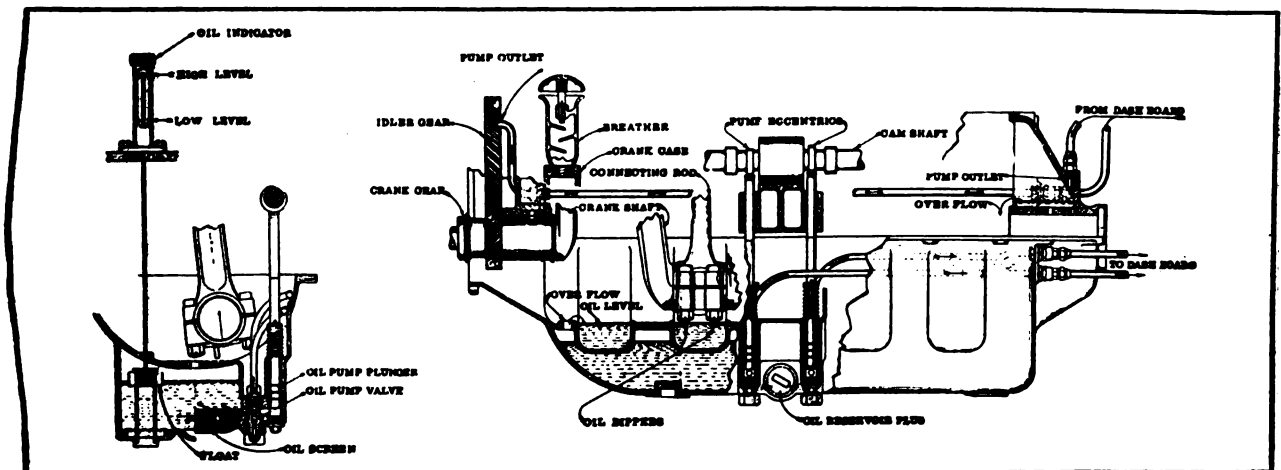
THE Abbott Motor Company, maker of the Abbott-Detroit motor cars, makes several excellent suggestions with reference to the care of the lubricating system of its models C 44, D 34-40 and E 44-50. The first is to purchase the highest grade of lubricant on the market; second, to remove the old oil every 1000 miles and clean the system, and the third is to maintain the level of supply.

The principle of the lubricating system used by the company is shown in an accompanying illustration, the view at the left depicting the float in the reservoir and the high and low level

the old lubricant is to be removed and replaced by new.

The system is classified as a constant level splash with a positive plunger pump to circulate the lubricant, and it cares for every bearing, gear, etc. The two positive plunger pumps are actuated by an eccentric on the camshaft, these supplying a constant stream of oil to the timing gears and rear main bearing, as will be noted by the oil leads. The overflow drains into four separate compartments into which the ends of the connecting rods dip or splash.

A predetermined or constant level is main-



Lubricating System Employed on Models C 44, D 34-40 and E 44-50 Abbott-Detroit Cars.

of the indicator. The sketch also shows the oil plunger pump, valve and the screen utilized to filter the lubricant.

The drawing at the left depicts a section of the crankcase, also the method of feeding the lubricant to the splash compartment. The overflow or stand pipes are shown in the larger drawing.

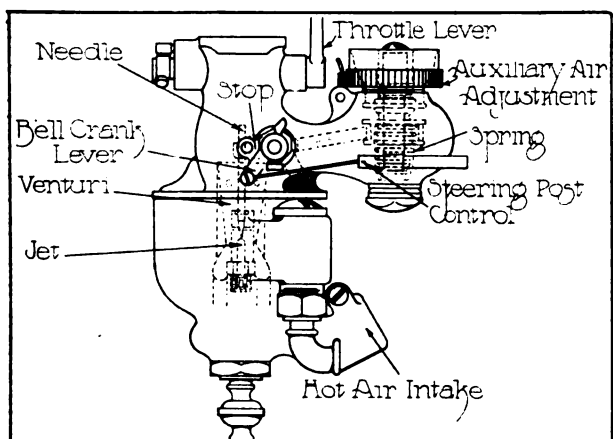
The supply is replenished through the breather pipe, which is provided with vanes to prevent the crankcase compression blowing out the oil mist. The indicator or gauge is located on the right hand side of the engine, between the second and third cylinders, and the proper level to maintain is between the high and low points. Above the high is not recommended. About .375 inch below the mark indicated is held to obtain the best results. With the level at the proper height there will be about 8.75 quarts of oil in the reservoir, a point worth considering when

tained by the use of overflow or standpipes, by means of which any excess lubricant drains into the sump, but it is screened before it is circulated by the action of the pumps. The object of employing separate compartments for the connecting rods is to prevent the oil from flowing to the rear of the crankcase when the car is ascending grades, a condition which would result in flooding one section of the crankcase and starving the working parts in the forward portion of the motor.

At least every 1000 miles the plug in the side of the lower half of the crankcase should be removed and all the old lubricant drawn off. It is suggested that it be examined carefully for any evidence of metal, which, if present, will indicate trouble. The screen should also be thoroughly cleaned before replacing. At least once a season the lower half of the crankcase

should be removed for cleaning and inspection.

The oil indicator assembly is located on the right hand side of the motor, midway between



Sectional View of Model 79 Overland Carburetor, Showing Its Only Adjustment, the Auxiliary Air Valve Spring.

the front and rear supporting arms. The indicator glass and cover are mounted on the crankcase, and the guide on a metal plug in the bottom of the oil pan. By unscrewing this plug, the float and pointer can be removed. Care should be taken not to bend the wire as it will bind and will not indicate correctly the supply of oil on hand.

OVERLAND 79 CARBURETOR.

The carburetor utilized as standard equipment on the model 79 Overland car is the latest type Schebler, which was designed for the Willys-Overland Company by the Indianapolis concern. It embodies practically the same principles of the model R Schebler, and differs from the earlier types in that the needle valve is actuated by the auxiliary air valve, a lever connecting the latter and the needle. This construction is a pronounced variance from other Schebler carburetors which employ a cam for lifting the needle and proportioning the fuel emerging from the jet to the air.

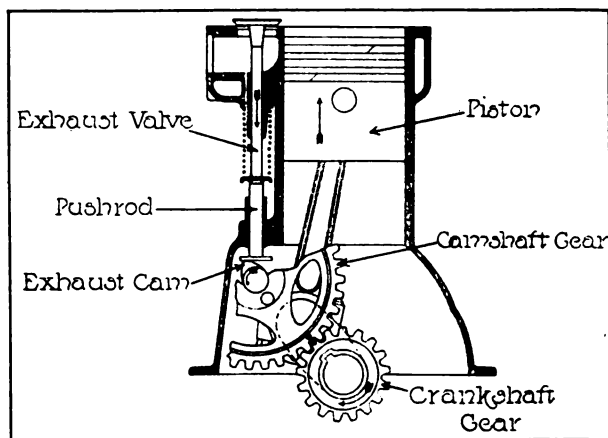
The Overland carburetor shown in an accompanying illustration has but one adjustment, whereas some Schebler designs have three fuel and one air adjustments. In the Overland design the regulating of the auxiliary air member controls also the emergence of the fuel from the jet, and by referring to the drawing the operation of the lever may be discerned with a little study. It will be seen that one end of the lever is mounted above the auxiliary air spring, while the other is attached to a bell crank lever. The

connections are so made that upon the auxiliary spring being depressed, the lever will lift the needle valve from the jet, augmenting the supply of fuel.

The supply of air at low motor speeds is obtained through a fixed or constant air intake, being drawn in by the suction of the piston. This primary air is taken in through the hot air intake and the proportions of gasoline and air are determined by the position of the needle valve to the jet, which is located in the venturi tube.

There is but one place for the owner to adjust, this being the auxiliary air member, which is rotated to the right or left to alter the adjustment. Turning the knurled sleeve to the right increases the tension of the spring, so that a greater suction will be required to open the air valve, and consequently, the mixture will be enriched, and up to certain speeds less fuel will emerge from the jet. Rotating the sleeve to the left decreases the tension of the spring, allowing the air valve to open more easily, and weakening the mixture because of the increase of air. As previously pointed out, the lowering of the end of the lever attached to the auxiliary air valve spring, raises the needle valve, while lifting it restricts the emergence of the fuel from the jet.

With the Overland carburetor the proportions of fuel and air at high speeds are secured automatically by the auxiliary air spring, which is a compensating device in that it is actuated by the suction of the piston. The design makes for simplicity in that the owner is not required to alter the proportions of fuel and air to meet the



Showing Position of Exhaust Cam, Valve, Crank, Connecting Rod and Piston of First Cylinder of Model T Ford Motor When Gears Are Removed.

requirements of the motor at different speeds.

Steering post control is a feature of the carburetor and it will be noted that a Bowden wire

is connected to the bell crank lever actuating the needle valve. The other end of the cable leads to the steering column, permitting the driver to lift the needle and enrich the mixture for starting, as well as regulate to a certain extent, the supply of fuel.

If for any reason it is necessary to alter the proportions of fuel and air, the auxiliary air sleeve should be turned but slightly until the desired result is obtained. The Willys-Overland Company states that it is best suited to the motor having been subjected to exhaustive tests before being adopted. As with all types of carburetors it is an excellent plan to occasionally open the drain cock and run off a small quantity of fuel. This will remove any water or sediment that may be in the fuel. If the carburetor is suspected of being flooded, open the petcock and with the ignition cut out, crank the motor.

FORD CAMSHAFT SETTING.

With the four-cycle internal combustion engine utilizing poppet valves, the valves are opened by the cams of the camshaft, which raise the pushrods and overcome the tension of the valve spring. The camshaft is provided with a gear, which is in mesh with a gear on the crankshaft of the motor, as shown by an accompanying illustration, which depicts the arrangement of the valve mechanism of the model T Ford motor. Normally, and when the valves are not admitting the mixture or permitting the burned gases to pass out, they are held seated by a spring.

The opening, closing, etc., of the valves is termed the timing of the motor, which is determined by the designer of the engine and is obtained by placing the cams on the camshaft at certain angles, and by maintaining a fixed relation between the camshaft and the crankshaft, by means of gears. When the shafts are assembled the crankshaft gear is so meshed with the camshaft gear that the cams of the last named will lift the valves at regular intervals.

For example: With the Ford engine the inlet valve is supposed to start to lift when the piston has completed the exhaust stroke and has travelled downward .125 inch on the suction stroke. The exhaust valve opens .25 inch before the piston completes the firing stroke. It is important that this timing be observed if maximum efficiency is to be obtained from the motor.

The proper meshing of the camshaft gear with that of the crankshaft member is a simple matter if the teeth are marked, which is generally done by the workmen at the factory. This

makes it easy to replace the shafts correctly in the overhaul of the motor, but should either marked tooth become broken through an accident, the replacing of the new gear and its meshing with the crankshaft member would be made by observing the following:

Rotate the crankshaft of the motor until the piston of the first cylinder is in the position shown in the drawing, which denotes that it has not completed its stroke. The crankshaft rotates clockwise, but the camshaft revolves in an opposite direction, as will be noted by the arrows. Replace the camshaft and mesh its gear with that on the crankshaft so that the exhaust cam is in the position indicated in the drawing. It should be borne in mind that the timing can be checked by utilizing the timing diagram of the motor, which is as follows:

Inlet valve opens .125 inch (piston travel) past top dead centre and closes .25 inch past lower dead centre. Exhaust opens .25 inch before lower centre and closes on top dead centre. When the valves are seated or between the periods of opening and closing, the space or clearance between the pushrods and valve stems should be .03125 inch. If more exists, it should be reduced, by utilizing valve stem adjusters, which may be obtained at any supply house carrying Ford accessories.

DISCOVERS NEW FUEL.

Will Require Special Carburetor, as It Is Too Heavy for Those Now in Use.

H. T. Cauller of Trenton, N. J., claims to have evolved a new automobile fuel, which he says can be produced with less expense than gasoline and possesses three times the power and efficiency of any fuel now used. He has named it "power and efficiency oil" and says that it is produced by a blending of various oils under a secret process.

The new fuel is described as a jelly like substance, and the inventor says it will be necessary to construct a special carburetor as it is an emulsion far too heavy to be carburetted successfully with the present instruments. He has filed an application for a patent, and believes he can produce the fuel to sell at 13 cents a gallon.

The Dunlop Wire Wheel Corporation of America has located its factory in Long Island City, N. Y., where it will manufacture the Dunlop wire wheels under license from the foreign concern.



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DEFINING A CYCLECAR.

The cyclecar branch of the automobile industry in America is hardly more than six months old. Undoubtedly, experimentation has covered a much longer period, but the first announcements made their appearance in June or July, 1913. The instant response in public interest was such as to cause the makers of numerous types of machines to list their product as cyclecars, although probably the generally accepted idea of a cyclecar was that of an automobile built along the simplest possible lines and with a narrower tread than standard.

During the last week in January, the Cyclecar Manufacturers' National Association was organized in Chicago, and its first business was that of adopting a definition intended to accu-

ately describe a cyclecar as such. The result really has been to divide all so-called cyclecars into three classes—true cyclecars, light cars and small cars—since membership in the association apparently is limited to manufacturers of machines with motors having piston displacement of 125 cubic inches or less and with weight of 1150 pounds or less. No mention is made of tread or other factors than these.

The terms light cars and small cars are not new. They were applied to automobiles long before the cyclecar movement was inaugurated. A few machines of standard tread now listed as automobiles, and never designated by their makers or regarded by others as anything else than automobiles, have piston displacement which would place them in one or the other of the two larger cyclecar classes.

The definitions adopted by this new association may be regarded an excellent working basis for further consideration, but unless some action is taken to more accurately describe these classes, additional confusion will result. It would appear that the whole matter must be taken up by the National Association of Automobile Manufacturers before the definitions can be accepted as final. And the present status of the cyclecar situation would seem to indicate that the sooner this action was taken the better.

NO COMPROMISE IN OHIO.

The Ohio State Automobile Association is to be congratulated upon the stand it has taken with reference to the attempt to patch up the so-called Warnes law so that it will comply with the constitution of the commonwealth. There is to be no compromise on the part of the association, its members reserving the right to attack any law that may be passed in the courts.

In the first place, automobile registration can be defended only upon the ground that it is based upon the police powers of the state. United States courts have held that when the fee is made larger than is sufficient to meet the expense of administering the law it becomes a tax. Some day this proposition will be carried to a court of last resort, and a definite conclusion reached, but at present the Ohio State Automobile Association is amply justified by the decisions in Ohio, Michigan and Mississippi, in the position that there is no reason for compromising.

ROAD CONSTRUCTION WITH REFINED TAR.

A Discussion of the Several Steps Taken by Massachusetts Highway Commission in Building State Roads Having Even Riding and Even Wearing Qualities.

ORGANIZED motorists have been instrumental in awakening widespread public interest in the matter of road construction and



Plant for Crushing Field Stone of Granite and Trap Rock.

maintenance. Automobile owners have a two-fold reason for studying the subject, the first being the added economy in operating machines over improved highways, which also involves the increased efficiency, not only of the automobile, but of any type of road vehicle. This point having been proven to the general satisfaction of all who have occasion to use public ways, the next step is to consider the proper application of funds which may be appropriated or assigned to such purposes. And here the motorist must have deep concern, because he is called upon to assume a large proportion of the expense of such work, both through the direct taxation of property and the indirect taxation imposed by registration fees, etc.

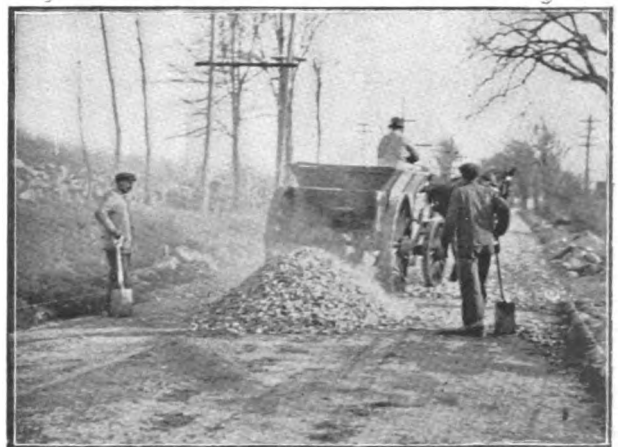
Massachusetts has long been regarded as an example in the matter of expending road funds, and the highways of that commonwealth have gained a wide reputation. For this reason, if for no other, any suggestion as to construction and maintenance methods which may be offered by those who have information relative to the work done by Massachusetts officials must be received with interest by automobile owners and users. The state highway commission has general supervision over the construction of state roads, and it is with respect to these that the greatest attempt has been made to provide that which shall be enduring and economical in maintenance cost. The following discussion is presented

by Phillip P. Sharples, recognized as one of the leading highway authorities in this country:
(By Phillip P. Sharples.)

The state highway commission of Massachusetts has used bituminous binders with a tar base since 1907. A survey of the work done, beginning at Wayland and at Norwood with surface coatings, leads down through a large number of experiments in road construction with varying amounts of binders and various sizes of stone, to the present thorough construction now being practised on the main traffic routes. During the present season a large amount of work has been done on the Worcester-Providence trunk line. Sections have been let in Grafton, Northbridge and at Blackstone. The work at Grafton is typical of this form of construction.

Much attention is given to the preparation of a proper base for the bituminous top proper. Previous work has shown that it is very essential to have a firm, unyielding base, if the top is to endure. Even with the early surface treatments the character of the foundation had much to do with the lasting qualities of the coating. At Norwood, where the base was firm and the macadam road in good condition, the surface coating endures to the present day with only renewals and patching, while at Wayland, where the base was less firm and the macadam in poor condition, the road required constant recoating and was so unsatisfactory that reconstruction work was begun last year.

At Grafton new culverts and new drainage



Dumping Stone for Top Course on Board Platforms.



Spreading Top Course by Hand, and Rolling Sand Base to Insure Even Riding and Even Wearing Road.

work were carefully planned to take care of all surface water and to intercept all underground water where it had a tendency to run from hill-sides underneath the road. The foundation was then levelled off and after rolling with a roller the base course of stone was put on, using four inches of crushed stone (passing a 2.5-inch ring and retained on a .5-inch ring). This course was thoroughly rolled with the steam roller and then bound in with a good binding gravel. After the base was complete it could be favorably compared with an ordinary macadam road. Over this thoroughly built base, a layer of stone passing a 2.5-inch ring and retained on a .5-inch ring was used, making a depth of two inches when rolled.

The use of large stone in the wearing course of the road is an innovation of the last few years in road building, but the results obtained seem to fully bear out the theory. With a water bound macadam it is necessary to fine up the stone on the top in order to get it to stay in place. The



Rolling Wearing Course Preparatory to Tarvia X Coat, the Road Being Rolled Until Surface Is Smooth, Even and Closely Packed.

same, however, is not true of a bituminous bound macadam, since the bituminous binder is able to hold the largest stone in place during the construction of the road and subsequently under traffic. The large stone has the advantage of a better resistance to wear, since it has not already been pulverized by the crusher, and also of transmitting the load to better advantage to the foundation. In using the larger stone, it is essential, however, that the bituminous binder should be so distributed and the subsequent layers of finer stone should be so placed as to insure a thorough bonding of the larger stone.

After the two-inch wearing course has been thoroughly rolled and smoothed out, it is ready for the refined tar binder. The stone used at Grafton was a species of granite, which, under the roller, produced enough fines by breaking up the large stone to lock them thoroughly together.

In the case of a very hard trap rock, it is nec-



Spreading Tarvia X, 1.5 Gallons to the Yard, the Material Being Delivered Hot by Motor Truck and Sprayed by Pressure Furnished by the Roller.

essary to supply a layer of stone crushed to the proper size to hold the larger stone in place and get the desired surface for putting on the binder. A thin layer of stone sized to pass a 1.25-inch screen and to be retained on a .75-inch screen is usually the right size for the purpose.

The refined tar binder was delivered to the Grafton road by the Barrett Manufacturing Company in auto trucks, and on the lower course was of the Tarvia X grade. It was sprayed on through a single atomizing nozzle attached to a single hose under a steam pressure of 20 pounds to a square inch taken from the steam roller. The binder was delivered hot from the works of the company situated at Everett, Mass., 45 miles from the job, and in spite of the distance was always in condition to begin spraying immediately on arrival of the truck.

Great care was taken to spray the binder on evenly and the best possible man on the work was chosen for this purpose. No drainings from the tank at the end of the job were permitted to go on the road and, also, it was made sure that the nozzle was spraying properly before any of the binder was allowed on the road. The result of this careful attention to details is shown in the completed work. The surface is uniform from end to end and the road is of perfect riding quality even in an automobile going at a high speed.

A gallon and a half per square yard of the Tarvia X was used. Workmen followed at once, throwing on a very thin layer of clean pea stone (one-quarter to one-half of an inch). Care was used not to make any very distinct layer of this stone, but enough was applied to thoroughly chink in the surface and to keep the steam roller from sticking. As soon as the tank load of binder



Road Rolled Ready for Seal Coat, Any Excess Pea Stone Being Swept Off.

An example of the use of a Tarvia X seal coat is to be seen on this same road at Blackstone where the Tarvia was delivered in tank cars, heated by a steam boiler alongside of the work and put on from a uniform distributor.

The seal coat on the Grafton work was sprayed on from a pressure distributor attached to the truck. The distributor consists of a rotary pump geared to the driving shaft of the motor and delivers the hot tar to the spray nozzles at a pressure of 35 pounds. The resulting spray is extremely uniform and with the truck at the lowest speed gives approximately one-half of a gallon to the square yard. With the road ready, the truck can spray on 1200 gallons of seal coat in 30 to 40 minutes. Men follow closely behind the sprayer, spreading clean pea stone over the seal coat. The roller follows in order to insure a thorough incorporation of the pea stone in the seal coat. As soon as the roller has finished the road may be opened to traffic without further de-



Putting on Clean Pea Stone Over the Tarvia X, Only Enough Stone Being Used to Chink Up the Surface Soil and Prevent Roller from Sticking.

had been distributed, the roller was put on the road to smooth out the surface and thoroughly consolidate the wearing course.

After this thorough rolling the surface was ready for a seal coat. This was generally delayed for several days until sufficient area had been obtained to take a whole truck load of bituminous material. For the seal coat a Tarvia A grade was used, since experience has shown it to give slightly better results than Tarvia X, which is more generally used for this purpose. Tarvia X is, however, still used when the binder is delivered in tank cars, since it is then difficult to so regulate the work that the two grades can be used at the same time. With motor trucks, however, the combination of the two grades is easily planned for.



Spraying Tarvia A Seal Coat, Half a Gallon to the Square Yard, Delivered by Motor Truck and Sprayed Under Pressure by Rotary Pump Geared to Truck Motor.

lay. This is a great advantage where it is impossible to turn the traffic aside except for short intervals. Roads built under these specifications



Spreading Pea Stone Over Seal Coat—Road Is Rolled Again and Is Then Ready for Traffic.

are showing up exceedingly well with the Massachusetts state road traffic. They are smooth, very agreeable to ride upon, can be used as soon as finished, and give a low cost of upkeep through a long period.

The method of maintenance consists of surface applications of bituminous materials as required. Thinner grades of tar binders have proved very successful for use over tar bound macadam roads. For this purpose thinner grades of refined tars are used, such as Tarvia A and Tarvia B of the Barrett Manufacturing Company. Roads treated in this way show extremely low cost of maintenance and are always in good condition, both in summer and winter. Good examples of this method of maintenance are seen at Westminster, Mass., and at South Walpole, Mass. Both roads were built in 1909, and have required but a single surface coat since the original work was completed. The seal coat was put on at a cost of about eight cents per square yard, making the total maintenance cost per square yard on these roads for a period of four seasons very small.

With the modern type of distributors the costs of surface treatment have been very much reduced, so that the maintenance of this type of road becomes a very easy problem. This method of construction and maintenance also fulfills the new requirements for motor truck traffic. The firm, strong base and the well bound top are capable of upholding the heavy loads imposed by the motor truck, while the surface seems to be proof against all ravelling brought about by

the shear produced by the tractive effort of the driving wheels of the truck.

The wisdom of the recent work with tar binder in Massachusetts is upheld by a comparison with recent work in England. The motor truck problem is much more acute in England than in the United States, since the trucks were earlier in the field and have multiplied much more rapidly in proportion to other traffic on the road. In response to the need, many miles of tar bound macadam have been built in England during the past four or five years. Reports of the condition and behavior on these tar bound roads brought back by delegates returning from the London Road Congress, show that they are standing up admirably under the heavy duty imposed upon them and giving good satisfaction.

BANQUETS PARTS PRODUCERS.

King Motor Car Company Acts as Host at Fellowcraft Club in Detroit.

One hundred representatives of parts makers and firms from which the King Motor Car Company, Detroit, purchases its materials, were entertained at a banquet at the Fellowcraft Club in that city by officials of the company, Jan. 24. The event was announced as another step in the policy of co-operation inaugurated by the King company when it presented its employees with a dividend on wages earned by them during 1913.

Artemas Ward, Jr., president of the company, acted as toastmaster, and among the speakers were the following: T. P. Chase and Luman W. Goodenough of the King company; A. D. Plig-



Completed Road Ready for Traffic, as Presented by the New State Road at Grafton, Mass.

hoff, manager of the J. W. Leavitt Company, San Francisco, and Charles B. Wilson of the Ferro Machine & Foundry Company, Cleveland.

CORRESPONDENCE WITH THE READER.

Six Versus Four Cylinders.

Kindly explain the advantages of the six-cylinder motor. I note by your book that more six-cylinder machines are being made this year than last.

FOUR-CYLINDER OWNER.

Buffalo, N. Y., Jan. 29.

The advantages claimed by the advocates of the six-cylinder motor are: Continuous application of power to the crankshaft of the motor, more perfect balance, absence of vibration, flexibility, hill climbing qualities, economy of operation and upkeep and quietness.

In a single-cylinder, four-cycle motor four strokes of the piston are required to obtain a power impulse. Assuming that the stroke of the cylinder is five inches, the total number of inches travelled to obtain an impulse stroke is 20, and during the operation power is produced for approximately less than five inches, the firing stroke. The balance of the distance travelled by the piston is a loss of energy in that the inertia of the flywheel is utilized to complete the exhaust, intake and compression strokes. In a two-cylinder motor the impulse strokes are separated or spaced, and in a four-cylinder engine there are four strokes, but as will be noted by the diagram at Fig. 1 there are intervals when there is no application of power to the crankshaft of the motor.

With a six-cylinder unit the power strokes overlap; that is, before the piston of the first cylinder has completed its impulse stroke, the charge in the next cylinder to fire is ignited, and this overlapping continues throughout the firing order of the motor.

In a four-cylinder engine the cranks of the crankshaft are set 180 degrees apart; that is, diametrically opposite. Thus in a four-cylinder motor each piston is one complete stroke behind its predecessor. With the four all of the cranks are at dead centre twice on each complete revolution. With the six-cylinder motor not more than two of the six cranks are at dead centre at a time.

Jump Spark Ignition.

Why is it necessary to use a coil with the high-tension system of ignition? Do magnetos have to have a coil? If the voltage of six dry cells is six, what is it when the spark takes place at the spark plug?

NEW OWNER.

Beloit, Wis., Jan. 28.

A coil is used to increase the electromotive force in the secondary circuit, so that it will overcome the resistance at the gap of the spark plug. Air is a non-conductor of electricity and with a space of .03125 inch between the electrodes of

the plug, which is practically a break in the circuit, sufficient energy must be developed for the electricity to jump the gap.

The voltage of six dry cells is approximately six and is not sufficient to overcome the resistance of the air. The resistance to the passage of the current increases with the pressure of the air which surrounds the points of the plug, and with internal combustion engines the spark is utilized to ignite the charge after it has been compressed by the piston, consequently a considerable voltage is necessary.

The actual voltage needed is shown in the chart at Fig. 2, the diagram depicting the electromotive force required to bridge a .02-inch gap with various compressions. At 80 pounds compression it will be noted that over 12,000 volts are necessary to overcome the resistance referred to.

The primary current of the dry cells is trans-

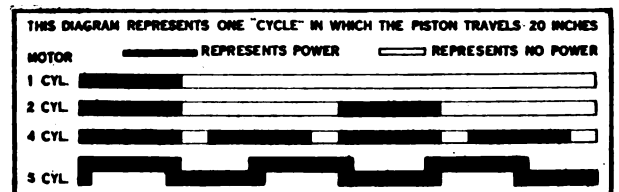


Fig. 1—Diagram Illustrating the Power Strokes of Single and Multi-Cylinder Motors.

formed into a high-tension by an induction coil, which comprises a winding of coarse (primary) wire, and another of fine (secondary) wire. This self-induction, so called, is greatly increased by utilizing a core of soft iron wires around which the windings are placed.

The same principle is employed with magnetos. With the true high-tension types, the armature is wound with coarse and fine wire, and the primary current is transformed into a secondary in the instrument itself.

With low-tension magnetos, also called high-tension, the armature has but a single winding of coarse wire, and the electricity generated is transformed by a separate coil, then led back to the instrument and distributed by it to the spark plugs.

Pitch of Gears and Vernier.

What is the diametral and circular pitch of gears? Will you explain the meaning of pitch terms, also what has the vernier to do with it? I noted use of the words in a book I was reading on trucks.

A. B. T.

Dallas, Tex., Jan. 30.

In the cutting of gears, diameter is always understood to mean the pitch diameter. Dia-

metral pitch is the number of teeth to each inch of the pitch diameter. For example: If a gear has 40 teeth and the pitch diameter is four inches, there are 10 teeth to each inch of the pitch diameter, and the diametral pitch is 10, or, in other words, the gear is 10 diametral pitch.

Circular pitch is the distance from the centre of one tooth to the centre of the next, measured along the pitch line. For example: If the distance from the centre of one tooth to the centre of the next, measuring along the pitch circle, is .5 inch, the gear is .5-inch circular pitch.

For facilitating the measurement of wheels to be sized according to diametral pitch, either Brown & Sharpe No. 61 or 78 steel rules are utilized. The former is a 12-inch member, containing four lines of graduations upon each side, each one as follows: 18ths, 22nds, 24ths, 26ths, 28ths, 30ths and 32nds. Each line of graduations is

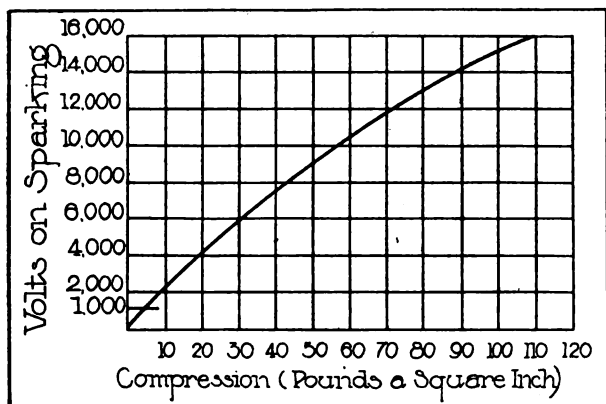


Fig. 2—Curve Showing Voltage Required for High-Tension Current to Bridge a .02-Inch Gap with Various Compressions.

figured the whole length of the rule, 10, 20, 30, etc. If a wheel of 60 teeth and of 20 pitch is to be sized, 60 is located on the line of 20ths and that is the pitch diameter of the required wheel. Two of the divisions are added to make the outside diameter, which is 62 20ths.

The No. 78 rule is a 12-inch member, having one inch only of graduations on each end, as follows: Sixths, sevenths, eighths, ninths, 10ths, 11ths, 12ths, 14ths, 16ths, 18ths, 20ths, 22nds, 24ths, 26ths, 28ths, 30ths, 32nds, 34ths, 36ths, 38ths. The intermediate 10 inches are blank, except that the inch lines are made clear across the rule.

Suppose a wheel of 83 teeth is to be sized. Take eight of the blank inches and three of the 10ths graduations, which gives the pitch diameter of the required wheel. Add two of the 10ths, which gives the outside diameter, or 8.5 inches.

The vernier is a device for reading finer divisions on a scale than those by which the scale is

divided. Sixty-fourths are about the finest divisions that can be read accurately by the naked eye. When fine work is necessary, the vernier is employed.

One division of the vernier is equal to .9 of one division on the true scale, consequently the difference equals .1 of the true division, or when each of these is one inch, .1 inch. The difference at the second division is .02, at the third .03, and so on. If the vernier be moved until the third division coincides, it will have moved .03 inch. It is this principle that is applied to measuring instruments.

When graduated to read in thousandths, the true scale is divided into 50 parts to the inch and the vernier graduated into 20 parts, each division of the vernier being equal to nineteen-twentieths of one of the true scale. If the vernier be so moved that the lines at the first division coincide, it will have moved one-twentieth of one-fiftieth, or .001 inch. At Fig. 3 is shown the application of the device, depicting the method of measuring a sprocket tooth. The insert presents the fine divisions somewhat enlarged.

Tungsten Steel and Magnets.

What is the tungsten steel used by magneto makers? Is it superior to regular steel, such as chrome nickel, and is it a combination of alloys or a metal by itself?

INTERESTED READER.

Boston, Jan. 27.

Tungsten as a chemical is a rare element of the chromium group found combined in certain minerals, as wolframite and scheelite, and isolated as a hard, brittle, white or gray metal melting at 2000 degrees centigrade and having a specific gravity of 16.6-19; called also wolfram.

As a metal, steel containing a small amount of tungsten is noted for tenacity and hardness, even under a considerable degree of heat. It is utilized for magnets, since it retains its magnetism longer than ordinary steel. By incorporating simultaneously carbon and tungsten in iron, it is possible to obtain a much harder steel than with carbon alone, without danger of extraordinary brittleness in the cold metal or an increased difficulty in the working of the heated metal.

Graphiting Rims.

On page 55 of the Jan. 10 issue of your book you give a recipe for the care of rims. We are frequently cautioned to avoid the contact of tires with oil. Please state what oil should be used in your recipe, and how can the mixture of oil and graphite be rubbed well into the pores of anything so compact as iron. How much superfluous material should be removed and how much left to produce the high polish referred to. I am quite familiar with the use of powdered graphite and oils as an excellent packing for unions and pipe flanges, and as a lubricant, etc., for screw joints, but I have always left it on the surfaces in considerable quantities, and hardly

see how it will resist water and rust if removed. For the protection of rims I have used shellac. It is fair, but not completely successful. I should be pleased to substitute the graphite treatment, if better, but can hardly reconcile the difficulties named above. H. P. T. Wareham, Mass., Jan. 25.

Ordinary cylinder oil, if not too heavy, can be used in preparing the mixture to which reference is made. As mentioned in the article, enough powdered graphite should be added to the oil until a very thick paste is obtained.

The pores mentioned refer to the surface of the rims, which are not ground and polished. An examination of the rims will reveal tiny depressions or crevices, especially if a magnifying glass be used. These will retain more or less of the mixture even when the surface is well rubbed by a cloth. A combination of oil and graphite used as directed will result in a polished surface, although in the operation it may appear that the greater quantity of the material is removed by the rubbing. The treatment can be improved by sprinkling the rims with dry powdered graphite in addition.

The recipe is based on the actual experience of the writer with rims and tires extending over a period of several years, and he holds that it is superior to the use of shellac for several reasons. The coating of graphite does not increase the diameter of the rim as does shellac, and when fitting a new, cold tire, the shoe slips over the rim easily because of the well known lubricating qualities of the graphite.

The amount of oil used in preparing the mixture is so slight as to be a negligible factor. The writer has carefully noted the shoes used on graphite rims, and, aside from a very slight discoloration, has found the rubber to be in good condition. Another advantage is that a few cents will purchase enough graphite to last for several seasons. It is easily and quickly prepared, and the tires may be replaced as soon as the surplus mixture is removed.

Lighting Dynamos.

Will you kindly advise me if there is any publication on the market dealing with the constructional details regarding automobile lighting dynamos; how to build such a machine for service with a windmill for lighting a house? I would also like to know if you can give me the approximate cost and horsepower of the dynamos of the following lighting systems: Vesta, Berden, Dyalux, Delco, Deaco, K-W, Holtzer-Cabot, Gray & Davis, Apelco, Hartford, Ward Leonard and Wagner. C. F. S.

Allegheny, Penn., Jan. 29.

The constructional details of the various automobile lighting systems are given in "Lighting the Motor Car by Electricity", published by The Automobile Journal Publishing Company.

Regarding the second portion of this question,

the writer does not know of a book which gives complete instructions for the building of lighting dynamos driven by windmill power, but the information could doubtless be obtained from some book dealer. Generators are made by a number of electrical concerns, and it would be cheaper in the end to purchase one than to attempt to build.

The cost of the automobile lighting dynamos referred to varies, as several makers produce different types. They are not rated in horsepower as they generate electricity and require energy to drive or operate them. Electric motor starters, however, have horsepower ratings. Complete information as to the cost of automobile lighting dynamos will be supplied by the makers upon

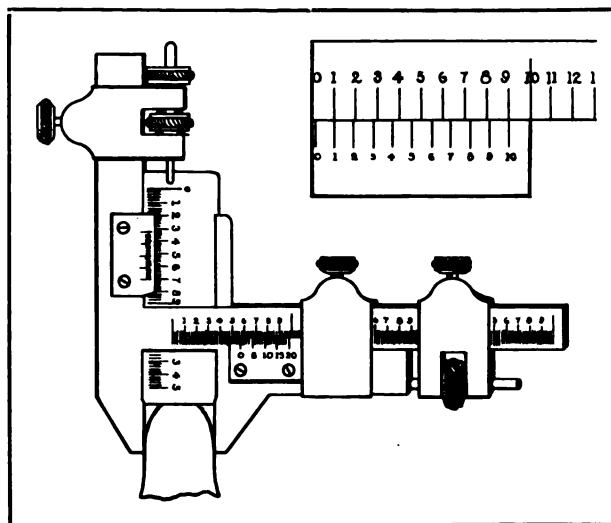


Fig. 3—Application of Micrometer Tooth Instrument and Vernier for Reading Fine Divisions.

request. The addresses of the makers of the systems named are as follows:

Vesta, Vesta Accumulator Company, 2100 Indiana avenue, Chicago; Berden, Esterline Company, Indianapolis, Ind.; Remy, Remy Electric Company, Anderson, Ind.; Rushmore, Rushmore Dynamo Works, Plainfield, N. J.; Delco, Dayton Engineering Laboratories Company, Dayton, O.; Deaco, Detroit Electric Appliance Company, Detroit; K-W, K-W Ignition Company, Cleveland, O.; Holtzer-Cabot, the Holtzer-Cabot Electric Company, Brookline, Mass.; Gray & Davis, Gray & Davis, Inc., Boston; Apelco, Apple Electric Company, Dayton, O.; Hartford, Hartford Suspension Company, Jersey City, N. J.; Ward Leonard, Ward Leonard Electric Company, Bronxville, N. Y.; Wagner, Wagner Electric Manufacturing Company, St. Louis, Mo.

The Haney Rescue Apparatus Company has been incorporated in Tampa, Fla., with capital of \$2,000,000, to take over the interests of the Haney Fire Apparatus Company of Stockton, Cal. It is planned to locate a \$75,000 factory in Tampa for the production of motor driven fire apparatus and outside fire elevators.

WITH THE CYCLECAR MANUFACTURERS.

Producers Form Association and Adopt Definition—Makes Displayed During the Chicago Automobile Show—Details of New Models Announced Recently.

AT LAST! The American automobile industry has a definition for a cyclecar. It is a motor vehicle having four wheels, propelled by a motor having piston displacement of less than 70 cubic inches and weighing less than 750 pounds.

This definition was evolved by the Cyclecar Manufacturers' National Association, formed during the progress of the Chicago automobile show, which also took steps to define other types of vehicles which have been classed as cyclecars in the past. Of these a four-wheel motor vehicle with motor having piston displacement of 70 to 100 cubic inches and weighing between 750 and

able discussion by all parties concerned, and comprised the first business of the session. A committee, representing the different classes of vehicles covered, was appointed for the purpose of making recommendation, in order that it might be known which concerns were eligible for membership. It would appear that the result was somewhat in the nature of a compromise, since makers of all three classes are represented on the official board, and the movement has been divided into three branches, for cyclecars, light cars and small cars.

The officers of the association are: President, W. H. McIntyre, Imp Cyclecar Company, Auburn, Ind.; vice president, Harry J. Stoops, American Cyclecar Company, Bridgeport, Conn.; treasurer, J. P. LaVigne, LaVigne Cyclecar Company, Detroit; secretary, William B. Stout, Stout Cyclecar Company, Chicago.

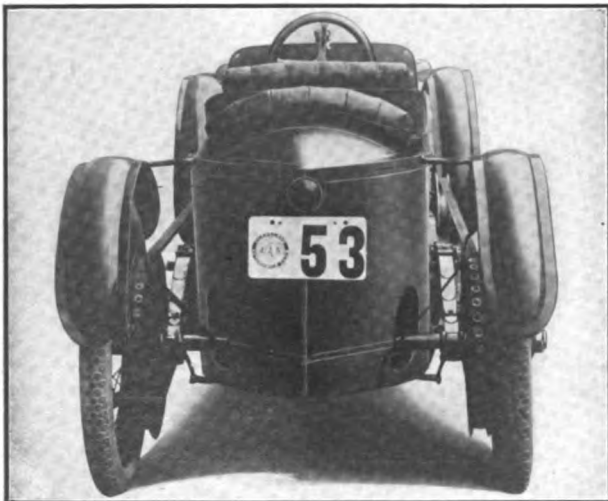
AT THE CHICAGO SHOW.

Eight Makes Displayed in the Coliseum and Six Others Outside.

In view of the new definition of a cyclecar, it is a trifle difficult to make comparison between the number of makes on display at the Chicago national automobile show, and the exhibition held in New York City earlier in the month. Disregarding this definition for the moment, there were eight makes at Chicago and six at New York. Six others were displayed at private shows throughout the city.

The eight makes in the Coliseum were divided as follows, under the definitions of the Cyclecar Manufacturers' National Association: Cyclecars, Imp, Mercury, Coey Junior and Kellarkar; light cars, Trumbull, LaVigne and Rex; small car, Car-Nation. Those outside included the following: Cyclecars, Flagler, Steco, Dayton and Zip; light cars, Woods Mobilette and Rayfield.

Of the makes shown in the Coliseum, two were entirely new, not having been announced previous to the opening of the show. The Coey Junior has side-by-side seating with wheelbase of 96 inches and tread of 42. The motor is a twin-cylinder Mack. The concern also offers a coupe model, but as this is equipped with a four-cyl-



Fidella, Announced as a Sister of Bedella of Paris, France.

950 pounds is a light car, and a four-wheel motor vehicle with motor having piston displacement of 100 to 125 cubic inches and weighing between 950 and 1150 pounds is a small car.

It will be noted that these definitions do not take into consideration the matter of wheelbase, tread, seating arrangement or any other factor than the piston displacement and weight. That for cyclecars practically eliminates any but those fitted with two-cylinder engines, with one or two exceptions. Before they are accepted as final they undoubtedly will have to be passed upon by the National Automobile Chamber of Commerce, but it helps some to have a definite working basis.

The definitions were arrived at after consider-

inder, water-cooled motor of larger piston displacement, it comes within the light car classification. The Kellarkar has tandem seating with 36-inch tread. It utilizes an air-cooled motor of the V type, a friction transmission and V belt final drive. In the light car class the Rex is also an entirely new product, and presents a number of distinctive features, included among which is the provision for driving to one front wheel.

DETROIT TO CHICAGO.

Mercury Covers the Distance Over Frozen Roads in Comparatively Good Time.

As was true of the New York show, the Chicago display was made the occasion for at least one overland trip by cyclecar, this being made by H. J. Woodall and Blair Steel in a Mercury, produced by the Mercury Cyclecar Company, Detroit. The journey occupied practically three days, the start being made from Detroit, Thursday, Jan. 22, at 6 in the evening. The party arrived in Chicago at 10 Sunday morning.

Because of the late start it was deemed advisable to make the first night stop at Ypsilanti, about 25 miles from Detroit. The remainder of the 300 miles was through Ann Arbor, Saline, Elkhart and South Bend, with the second night stop at Burton's cross roads, Mich. The third night was spent on the road. The only real delay of the trip was caused through oiling difficulties, due largely to the cold.

FIDELIA OF CLEVELAND.

New Model Is Introduced as a Sister of Bedelia of Paris, France.

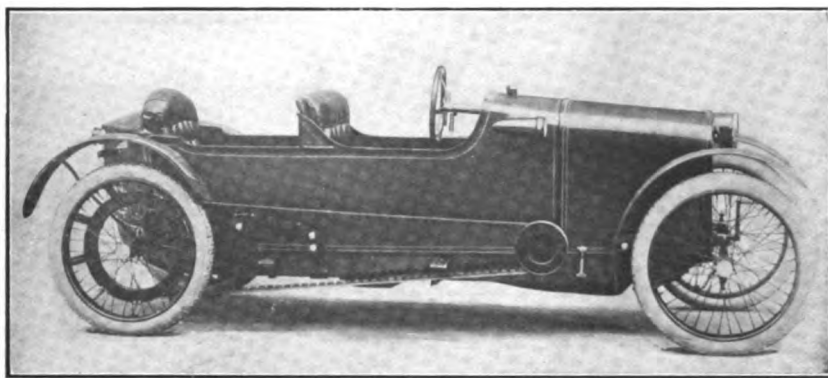
During the recent automobile show in Cleveland, O., the J. H. Sizelan Company of 61 Penrose street, that city, revealed a new cyclecar, termed the Fidelity, which was introduced as a sister of Bedelia, the name applied to the first cyclecar produced in Paris, France. This machine is designed to seat two passengers tandem, and has a wheelbase of 96 inches, tread of 38 inches and weight of about 425 pounds.

The motor is a two-cylinder DeLuxe, V type, rated by the maker at 10-12 horsepower, with piston displacement of 70.69 cubic inches. Cooling

is by air, utilizing the customary fan. Ignition is by Bosch magneto and the carburetor is a Schebler. The entire power plant is assembled as a unit and is suspended at three points under a hood of distinctive design. The 10-gallon fuel tank is located in the cowl dash, and a separate oil tank, holding one gallon, is placed directly in front of the dash under the hood.

A friction transmission is employed, this being arranged to afford three forward speeds and reverse. Final drive is by two 28-degree V block belts. Provision for braking is made by the use of external contracting blocks acting on the rear pulleys. Steering is accomplished by the conventional automobile knuckle and tierod to a special ball crank connected to the steering column and front wheels.

Full cantilever springs are employed front and rear, these being the product of the Perfection Spring Company of Cleveland. The wheels



Side View of Fidelity Model, Showing Belt Drive, Rear Spring Suspension and Carriage Type of Steps.

are of wire, fitted with 28 by three-inch tires. The road clearance is 9.5 inches. The passengers are provided with special hammock seats, and the whole design is with the idea of presenting a low centre of gravity, the seats being only 17 inches from the ground.

The body is described as a torpedo boat type, full streamline, and is accessible by steps on the side similar to carriage practise. The equipment includes a complete electric system, consisting of a 24 candlepower headlight, two six candlepower side lights and a four candlepower tail lamp, all of special design, and an electric horn.

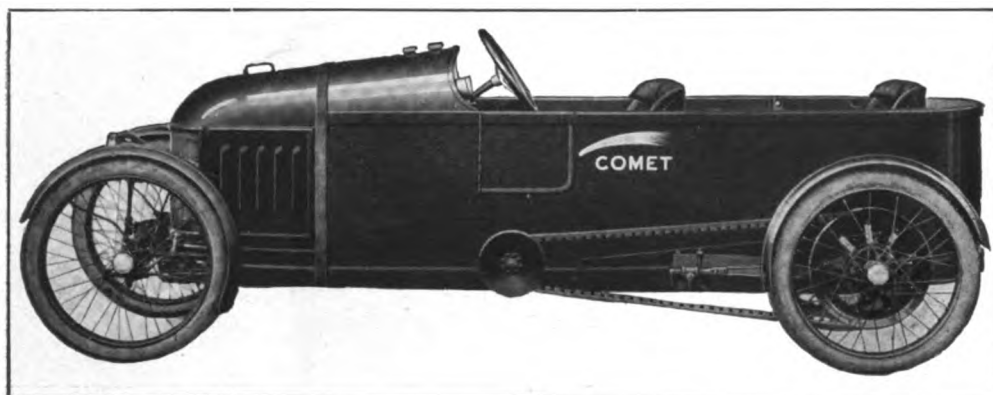
The Ward Cyclecar Company, Milwaukee, Wis., makes announcement of the Ward, utilizing a Mack motor, friction transmission and V belt drive. The wire wheels carry 28 by three-inch tires. The body seats two side by side. The wheelbase is 96 inches and the tread 41.

COMET IN TWO BODY DESIGNS.

Indianapolis Maker Presents Pleasure and Delivery Vehicle on Same Chassis.

The Comet Cyclecar Company, Indianapolis, Ind., announces two body designs fitted to the same chassis, one of which is designated as model A, a two-passenger tandem machine with 100-inch wheelbase and 36-inch tread, and the other as model C, a delivery wagon of 300 pounds capacity. The company has been experimenting with this chassis for the past year, and believes it has perfected a design which will prove satisfactory in every respect.

The motor is a DeLuxe two-cylinder unit, with bore of 3.5 inches and stroke of 3.67, rated by the maker at 9-15 horsepower. Ignition is by the Atwater Kent Unisparker system with automatic spark advance. Gasoline is fed by grav-



Note the Low Hung Appearance of the Comet Seating Arrangement, and the Attractive Body Lines.

ity from a three-gallon tank located under the cowl to the latest type of Schebler carburetor. Cooling is by air, the circulation being assisted by a two-bladed aeroplane type aluminum fan mounted on a ball bearing shaft driven by a belt from the crankshaft. The motor is enclosed by a removable hood with large louvers in the side and a screen in front.

The transmission is of the planetary type, and is located under the front seat. This affords two speeds forward and reverse and is operated by two hand levers and a pedal. The clutch is of the expanding ring type. Final drive is by two 1.125-inch V belts. The rear axle is suspended through links to the ends of the rear springs and can be shifted backward or forward, to accommodate the belts, through an adjustable torque rod arrangement. The front axle is tubular, with drop forged yokes brazed on either end and drop forged knuckles for the front wheels. Radius

rods are attached at each end of the axle inwardly to the frame through a ball joint connection.

The front spring is a semi-elliptic transverse member, 1.5 inches wide and 25.25 inches long, crossed over the front axle with the body suspended at the centre. The rear springs are quarter-elliptic, 28.5 inches long and attached to the body by substantial brackets. The steering gear is of the pinion and quadrant type, operating through a drag link to the steering knuckle on the front axle. The brakes are internal expanding on the rear wheels, the bands being three inches in diameter, and are supplemented by the transmission in reverse for emergency. The wheels are of wire, fitted with 28 by three-inch tires.

The frame is of four by one-inch second growth ash, and is built separate from the body, so that the two bodies supplied may be interchangeable if desired. The corners of the frame

are reinforced with steel angles. The pleasure car body is 23 inches wide, and it is maintained that it supplies ample leg room and storage capacity. It is made readily accessible by doors front and rear. The road clearance is 10 inches, and the weight about 650 pounds. The equip-

ment includes a complete gas lighting system, repair kit, pump, etc., and a top, windshield and speedometers are furnished as extras.

The company is composed of old manufacturing men, including E. R. and S. C. Parry of the Parry Manufacturing Company, and Marshall T. Levey of the Thornton-Levey Company, both concerns being located in Indianapolis. Fred P. Mertz is engineer. The factory is located at the corner of 10th and Canal streets, and it is stated that deliveries already are being made.

NEW CYCLECAR MODELS.

Brief Constructional Details Regarding Latest Designs Announced Recently.

M. C. Whitmore, Dayton, O., is working on the Arrow cyclecar, which is to be presented with

two types of bodies, one for two passengers seated tandem and the other for delivery purposes. The wheelbase is 100 inches and the tread 36. The motor is a DeLuxe two-cylinder, with Bosch ignition and Schebler carburetor. The transmission is of the planetary type, affording two speeds forward and reverse. Drive is by shaft and bevel gearing to a semi-floating rear axle. Wheels are of wire, fitted with 28 by three-inch tires.

T. E. Buckles, Manchester, Okla., is experimenting with a design which will seat two persons side by side. The wheelbase is 96 inches and the tread 36. The motor is a DeLuxe two-cylinder, with Bosch magneto and Schebler carburetor. The Buckles will utilize a friction transmission, with V belt drive. The wheels are of steel and will carry 26 by 2.5-inch tires.

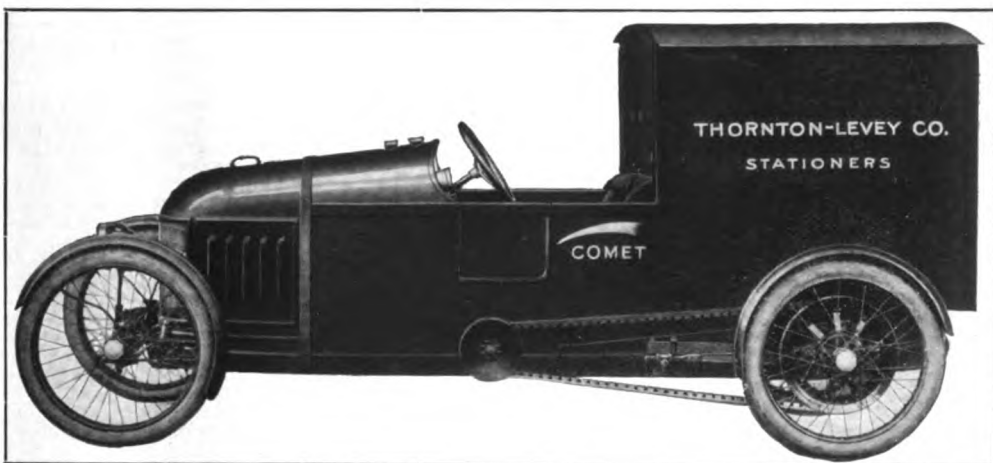
The Continental Engine Manufacturing Company, Milwaukee, Wis., has been experimenting upon a Continental cyclecar, which is to be produced in both pleasure car and delivery wagon types. The two passengers are seated tandem. The wheelbase is 96 inches and tread 32. The motor is of the firm's own design, being a four-cylinder, air-cooled unit, with bore of 2.68 inches and stroke of 2.93. The cylinders are of the T head type, cast separately, and lubrication is either by circulation or non-circulating splash, as purchaser desires. An option also is offered in the matter of ignition, either a Bosch or an Eisemann magneto being utilized upon order. The carburetor is a Schebler. The machine employs a friction transmission, and final drive is by either chain or belt. The wheels are of wire, with 30 by three-inch tires.

William B. Engler, Pontiac, Mich., is announcing the Engler, a tandem seating cyclecar with 110-inch wheelbase and tread of 36 inches. The motor is a V type, air-cooled, rated by the maker at 10 horsepower. The transmission is friction, final drive being by V belts. The rear spring suspension is of the cantilever type. The wire wheels are equipped with 28 by three-inch tires.

The Warren Electric & Machine Company, Indianapolis, Ind., presents the Hoosier, which is said to be built somewhat along the lines of a racer and with good wind resisting lines. The wheelbase is 96 inches and the tread 36. The motor is a DeLuxe; transmission, friction, and final drive, V belt. It is understood that this machine will be offered with both tandem and side-by-side seating.

The Northwestern Motorcycle Works is still another Chicago concern to produce a cyclecar, this being known as the Logan. It utilizes a DeLuxe motor, equipped with Atwater Kent ignition; a friction transmission and final drive by V belts. The wheelbase is 92 inches and the tread 40. The two passengers are seated by side by side.

The Keller Cyclecar Company, Chicago, is one of the latest to announce a cyclecar from that city. The Keller will seat two persons



How the Comet Cyclecar Company Seeks to Solve the Package Delivery Problem.

tandem, the wheelbase being 96 inches and the tread 36. The motor is a two-cylinder, air-cooled Wilson, with bore of 3.5 inches and stroke of 3.62 inches. Ignition is by the Atwater Kent Unisparker system. The machine will employ a friction transmission, with final drive by V belts.

The Ideal Shop, Buffalo, N. Y., goes one step further than other concerns by offering three options in the seating arrangement. The Ideal will be produced either for one or two passengers. In the latter type, the two persons may be seated tandem or side by side, at the option of the purchaser. The wheelbase is given as 96 inches and the tread as 36. The motor is a DeLuxe; transmission, planetary, and final drive by belt from the countershaft to rear wheels. The wire wheels will be fitted with 28 by 2.5-inch tires.

ANALYZES BALL AND ROLLER BEARINGS.

Part II—Professor Goodman of Leeds University, England, Discusses Various Types of Ball Bearings and Gives Formula for Calculating Maximum Workings.

IN HIS lecture before the Institution of Automobile Engineers, London, England, Prof. Goodman of Leeds University described and illustrated the results of his experience and tests with roller bearings, which report was published in the Jan. 25th issue of The Automobile Journal. The second part of Prof. Goodman's lecture dealt with ball bearings, in the modern type of which he said there was no end thrust at all, and no end thrust troubles. The friction was held to be very much less than in the majority of roller bearings, hence, there was a great deal to be said in their favor. The report concerning ball bearings follows:

Engineers would say, stated Prof. Goodman, that "the ball bearing only bears upon a point, while the roller bears on a line. Hence the ball bearing of a certain size

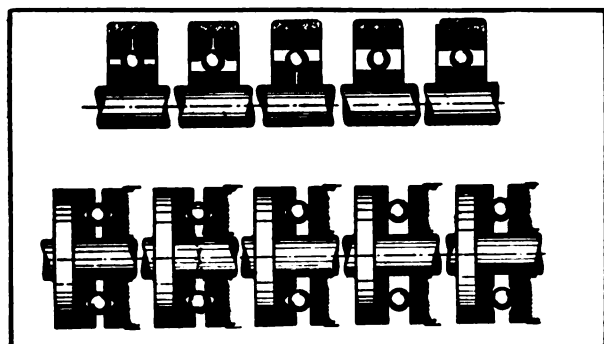


Fig. 5—Various Types of Ball Bearings—Those in the Top Row Are Journal Bearings and in the Bottom Thrust Bearings.

cannot possibly carry so high a load as a roller bearing of the same size."

There was an element of truth in that, but it was not the whole truth. If one had equally good material in rollers as in balls, and if one could be certain of getting no end thrust on roller bearings, that argument would hold rigidly, but since end thrust did come in, and since other troubles came in as a matter of fact in practise, the ball bearing with one exception was able to carry a much bigger load than any roller bearing.

He then illustrated and described the testing machine in which the roller and ball bearings were tested, and said it was of some interest, inasmuch as it was the only testing machine in which the load could be applied by lever. The machine was driven by an electric motor, and enabled a very high range of speed to be obtained. It would test loads up to 10 tons and give speeds up to 3000 revolutions a minute, or down to five or six revolutions a minute when required. The next slide showed the different types of ball bearings that had been used since their first application to machinery. Probably the earliest type was one having a steel sleeve with either a V or a rounded groove in the sleeve and the outer casing fitted with two conical rings.

The casing itself was tapped, and the rings were screwed on the outer edge, the idea of that being to al-

low the bearing to be adjusted. Nearly all the early makers aimed at making their bearings adjustable, and it was a great blunder. A little thought would show that that was so. With a heavy load on the top of the bearing and the upper part of the cones remaining stationary, the cones would get worn into a ridge. Then when the conical rim was rotated in order to take up the wear, a different part of the ring was brought into contact with the ball, and it ran partly on the old ridge and partly on the new portion. The ridge of the ring was no longer perfectly central. The ring was no longer circular at the part where the ball rolled, with the result that it was impossible to get anything like accurate adjustment for a bearing of that type.

The next type of bearing was made with a flat sleeve and cones, practically the same as the previous one, but the next arrangement was one where the sleeve itself was screwed on the shaft and the outer portion of the stationary part was made either plain or rounded. With that one could get much better adjustment, because the ring was always rotating and wore fairly evenly. Although the adjustment was not perfect, and the arrangement not altogether satisfactory, it was a great deal better than the previous one. There was something to keep the balls in position.

Bearings with Grooved Races.

Then the latest of all was a ball bearing with grooved races. The earlier grooved races were made with the radius of the groove equal to the diameter of the ball, or the radius of the groove twice the radius of the ball. The modern practise was to use a very much smaller radius than that, somewhere in the neighborhood of .5625 or .625 of the radius of the ball—the reason for that would be seen later—or else end thrust bearings were made with grooves of 45 degrees. They were, however, found to be anything but satisfactory. The balls ground and became very much crunched during the running of one of the early tests that he made of balls of 1.25-inch diameter. When they came out they looked like golf balls that had been badly used—very badly scratched.

The next improvement, or attempted improvement, was to make the races unsymmetrical at 40 degrees, but there was bound to be grinding with these unsymmetrical races, as they rotated at a higher speed in one part than in another. The races were so made that the ball would have a true rolling motion, similar to a conical bearing with a conical roller. That was a great deal better than the other, but still quite unsatisfactory in running.

Effect of Friction and Loads.

During several of the tests that he made of bearings of this type the grooves were ground to the greatest possible degree. Notwithstanding the accuracy and care taken in manufacture, he always found that the bearing heated up at first, but after it had been running it would settle down and the friction would fall to a minimum. Then, curiously enough, if the load were increased or decreased, friction invariably went up and heating occurred. He thought the reason for that was that the different loads so altered the shape of the races as to cause them to be unsuitable for the balls until after they had been running for two or three days, when they became properly bedded again. When the loads were altered the races sprang a little, and were no longer properly bedded, but after two days they would get all right again. It was anything but a satisfactory bearing, although friction was certainly lower and the balls lasted longer.

The next type was where a single V was used and a flat surface. That was better, but not satisfactory. Then the next type of bearing was that with perfectly plain rings and cages to hold the balls. They ran perfectly and gave not the slightest trouble. The balls improved with wear—improved with use—and the friction was in the neighborhood of one-third of the friction of the best

that had preceded it, and it ran in a highly satisfactory manner. Then as an improvement on that was the grooved race. The friction on these grooved races was always slightly higher than the friction on flat races, but the great advantage of the grooved races was that they would carry about two to 2.5 times the load that the flat races would carry. Even at the present time for certain purposes the flat race bearing was better than the grooved, but if one was certain of keeping the shaft and the race in line with their housings, then the grooved race was the better.

One of the earlier type of bicycle ball bearings was shown, having its races unsymmetrical and so arranged as to get a thoroughly rotary motion for the ball. This, however, was not altogether a success. Another was a three-point bearing, with the three points on the surface of the cones. It was fairly well used, but not altogether satisfactory. There was another type of bearing with grooved races and a cage to hold the balls in position on the hemispherical seating of the outer ring.

The lecturer went on to say that he had already spoken about adjustment, or, rather, the futile attempts that had been made at adjustment. The next point was to look at the workmanship in so far as ordinary two-point bearings with flat races were concerned.

Early Types of Bearings.

As regards workmanship in the early days of ball bearings, 25 or 30 years ago, bearings gave a great deal of trouble. The reason for that was very largely due to the fact that the balls and the races were not made with a sufficient degree of accuracy. If there was one thing brought out of late years above all others, it was the importance of accuracy in manufacture, and the ball bearings of today could never be made a commercial success except for automatic machinery for turning out the balls and races of a very high degree of accuracy. As showing the importance of getting accurate results, he had plotted a diagram, Fig. 7, showing the stresses that balls take. For example, it was shown that a .5-inch diameter ball with a load suitable for a slow running bearing showed a deflection of .0015 inch.

When two flat plates approached one another loaded and having a ball between them, if the ball was a thousandth of an inch out of truth there was 200 pounds extra load upon the ball. Suppose they had a thrust bearing and one of the balls was a thousandth of an inch larger than the rest, that ball would have 200 pounds or thereabouts more to bear than the others. The total load that might be put on a half-inch ball running at very low speeds was somewhere in the neighborhood of 300 pounds. Hence an error of one-thousandth of an inch in the diameter of the ball or one-thousandth of an inch error in the races would put somewhere about 200 to 300 pounds extra load on the ball, with the result of certain failure. With an inch ball a safe load was somewhere about 1000 pounds, and the effect of a thousandth of an inch error was to put an additional load of something like 800 pounds on the ball; similarly, with a 1.5-inch diameter ball in like proportion.

Adjustable Types.

With higher speeds the several loads would be very much reduced. That was to say, they could only work at somewhere about half loads. Hence, with fast running of a bearing it was of vastly more importance to get extreme accuracy in workmanship than with slow running bearings. It would be seen that a thousandth of an inch error in the dimensions of the balls, or a similar error in the races, was absolutely fatal to the bearing. In the bearing where adjustment was obtained by screwing up one of the cones it would be seen that if the bearing were worn to the extent of a thousandth of an inch it would be simply ruined at once by attempting to adjust it, because the race would be out of truth to the extent possibly of two or three-thousandths of an inch. Hence, anything in the shape of adjustment was quite out of the question.

He had already spoken of the slipping of rollers. Similarly in ball bearings there was always slip between the balls and the sleeve. It was a perfectly simple matter to prove that the speed of rotation of the cage itself was one-half of the speed of the shaft. Very light counters were attached, one to the shaft and one to the cage. Then the bearing was allowed to run under various loads for considerable periods, and the difference between the counters showed the amount of slip in the balls on the shaft. It was found from that that the

amount of slipping depended very largely upon the load.

A good many makers in the early days would say, though they would not think of making the statement now, "What does it matter if the balls are not all exactly of the same size to start with? Suppose some of the balls are as much as ten-thousandths of an inch bigger than their neighbors, after they had been running for a short time the larger balls will wear more than the smaller ones, and after a few days' running they will be approximately the same size and work as smoothly as the others."

Varying Diameter of Balls.

This was entirely fallacious, for this reason: The balls themselves were invariably carried in a cage, in which the large balls would get a larger proportion of the load than the small balls. Hence there would be more slip with the large balls than with the small ones. Hence the speeds at which they would tend to run would differ; but they could not differ, because the cage prevented that. Either the large or the small balls must slip, and it stood to reason that the balls which would slip were the balls with the smallest load upon them. Hence the small balls slipped and got cut up, scratched and damaged, whereas the large balls remained perfect, and exactly the reverse action occurred to that which some-makers in days gone by urged would happen. It was therefore of vital importance to get the balls all of exactly the same size as nearly as possible. All the best makers today would produce balls which they guaranteed to within one ten-thousandth of an inch of their proper sizes. There were, however, second class balls sold which were slightly above or below the standard. It did not matter one fig so long as all the balls were of one size in the bearing; they might deviate from the standard either above or below, but to mix second class balls indiscriminately would lead to a hopeless mess, and failure was certain to occur.

Some chassis makers fell into that mistake, thus accounting to a large extent for some of the troubles they experienced with regard

to wear of bearings. The wear on properly made ball bearings was practically nil. The balls wore to an extremely small amount in the early tests that he carried out at the loads and speeds adopted. He would run a bearing under a given load for perhaps 1,000,000 or 5,000,000 revolutions of the shaft. The balls were very accurately measured in a Whitworth measuring machine before and after with the object of finding the amount of wear. The greatest possible care was taken in the measurements, but sometimes he found that the second measurement showed the balls to be a shade bigger than before the test was carried out. That was undoubtedly due to errors in measurement. They were measured to the hundred-thousandths of an inch. One of his colleagues in the chemical department of the Leeds University offered to weigh the balls in a chemical balance. He (the lecturer) was quite hopeful, but even then in some instances the weights given after the tests were greater than before, evidently again due to errors in measurement. The methods were nothing like accurate enough.

Effect of Overloads.

Then came the question how to tell whether a ball was overloaded or not. He then hit upon the method of examining the balls under a microscope. If a ball was not overloaded, when examined under the microscope it would improve in appearance. A new ball straight from

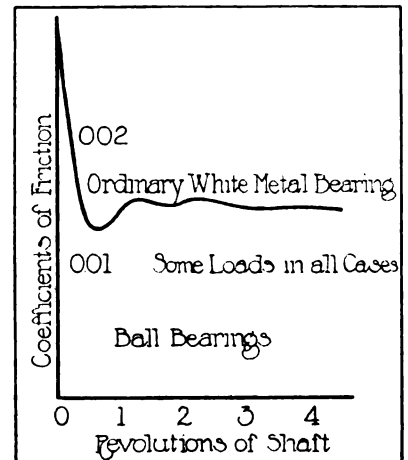


Fig. 6—Chart Showing the Greater Starting Effort in the Case of Plain White Metal Bearings as Compared with Ball Bearings.

the makers when examined under the microscope exhibited slight defects, but after it had been running a few weeks under a moderate load the surface materially improved, but if it were overloaded it appeared to be covered with tiny flakes of snow all over; the flakes were really tiny crystals which had broken away from the surface of the ball. When these specks appeared on a ball they could not be detected at all with an ordinary lens; it was necessary to work to 300 or 400 diameters of magnification. It was found that as soon as these specks occurred the ball would go wrong if continued under test at the same load.

The way in which they failed was interesting. With all the tests he had made, running over 15 years, he had only had about half a dozen balls actually break in the testing machine. Nearly all the failures—practically all—were due to the peeling of the ball. The surface of the ball peeled away like the peel of an orange. It was a most curious phenomenon that he had not yet fathomed. They nearly always peeled on one hemisphere and not on the other. He had scores which had peeled on one of the hemispheres, and could discover no reason why one-half of the ball should fail and the other half should not. It was an extremely interesting problem.

Hardening and Grinding Races.

In the rings and the races of the ball bearings it was extremely important to have simple cylindrical rings. In the early days he and many makers—he spoke of himself as testing the bearings—made the mistake of

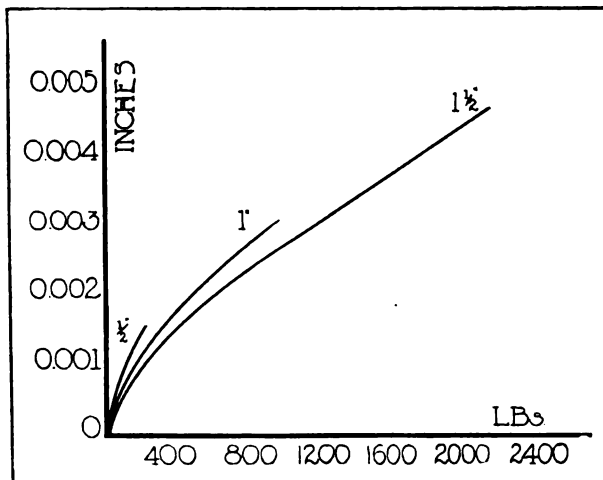


Fig. 7—Diagram Showing the Stresses That Balls Take.

having holes drilled in the races in order to attach the race to the shaft and to hold the races of the bearings themselves. Holes were drilled while the metal was in its soft state, and then hardened and ground. Invariably the races failed where the hole occurred. For certain purposes they had races made with a slight projection or lug upon them, and in every case these failed at the lug. A good many tests had been made, all pointing to the fact that for reliable ball bearings it was necessary to stick to the cylindrical form of ring and not have any grooves if they could possibly be avoided. He knew some makers would not agree with him, but he had conducted a great many tests, and he knew where the bearings all failed; it was where they departed from the circular form of ring. One interesting point in this connection was that in some of the early tests the inner ring was made somewhat longer, and two holes were drilled through it, and set screws were put through it into the shaft—screwed into the shaft in order to hold it in position. As soon as any load was put on the bearing the set screws or the pins in some instances sheared off immediately. He could not understand it. The coefficient of friction was a thousand, and the load on the bearing was known. It was a perfectly simple matter to find what the shearing stresses on the pin were, and he could not account for the breakage. It occurred to him that the coefficient of friction to be reckoned with was not the coefficient between the ball and the race, but the static coefficient between the shaft and the race. Assume that the race was a little bit big-

ger than the shaft, then as the shaft rotated one portion of the ring was stationary with regard to the shaft. The coefficient of friction to take into account for determining the load on that point was the static coefficient, which was somewhere in the neighborhood of one-third instead of one-thousandth, with the result that if one had a 1000-pound load on the bearing one might get 300 pounds shearing stresses on the pin. Looking at it in that light entirely accounted for the shearing of the pin.

Then he followed the usual method of attaching the sleeve to the shaft in the tests he made at first. He had the sleeve made slightly tapered, and screwed the shaft to it. A nut on it tightened it up. That answered fairly well except under the heaviest loads. Then one of the makers for whom he was working at the time suggested an adapter—usually a cone metal adapter. The bearing was made slightly tapered, and the ring was made taper, and the split adapter was put in. Then the nuts were tightened up, and drew the adapter into the bearing, and caused it to grip the shaft. That made quite a good arrangement for moderate loads; for fairly big loads it was not altogether satisfactory. The best way was either to shrink the inner ring onto the shaft or to force it on with a little hydraulic press; but one could easily do mischief. To allow too much would expand the ring to such an extent that it would jam the bearing. It must be remembered that they were working to ten-thousandths of an inch. There was extremely little shake, so that if the inner ring were expanded by one or two ten-thousandths of an inch the whole bearing would be jammed, and would have a very much bigger load put upon it than was intended. Many a bearing had failed through that. The safe way of getting the shrinkage was to make a rule that the shrinkage must not be more than one or two ten-thousandths of the diameter of the shaft. Or what was perhaps a more practicable way of dealing with it was to heat the inner ring in a bath of oil at about 150 degrees Fahrenheit. If it would not slip on too much shrinkage had been allowed, and if it slipped on too easily too little shrinkage was allowed. It ought just to slip on fairly freely, and it was better to have it a little too slack than too tight on the shaft.

Retaining Balls in Cages.

That shearing of the pins was quite an interesting point. On this type of bearing with perfectly plain rings, not grooved, one could readily get in the full number of balls. It was an old fashioned dodge, but a perfectly simple matter to pack in the full number of balls and slip in the cage in halves, but with a grooved cage some other method must be used to get the full number of balls in. What was usually done was that the ring was pulled to one side so that just over half the full number of balls could be packed in. Then they were evenly spliced and the spring cages were put in, or the ordinary solid cage, which was more commonly used at the present day, but one could only get slightly over one-half of the full number of balls into the bearing. In order to get more balls in the races were often grooved at the side and the balls forced in. As many as possible were inserted by the method first described and the others were forced in with a copper hammer, or were sprung in. These rings were liable to "go" just where the groove was made. This groove was filled in before the bearing was hardened; it was not now made quite so deep as formerly. In some of the earlier bearings a loose piece was fitted into the groove, or it was made the same depth as the race and the race fitted in. The race now was filed away so that it was not quite so deep and the balls were forced in.

In the Skefko bearing the balls could be got in quite readily. There were two suitable grooves on the main ring of the bearing. The whole ring could be fitted to one side and the balls could be slipped in. Besides getting in the full number of balls it was a great advantage, as a shaft which was very much out of truth would run perfectly. He had carried out tests with intentionally bent shafts to show the effect of that peculiarity. In the case of motor cars where the frame springs considerably that type of bearing lent itself very well to the requirements of the case.

Multiple Ring Bearings.

When a very big load was wanted to be taken on a thrust bearing, defects arose. One could not always get a sufficient number of balls in to carry the load. Therefore a bearing had been brought out, having a large number of balls in a cage with very big flat collars and race, but it was altogether a failure, for the simple rea-

son that the collars deflected under the load and the inner balls received more than their fair share of the load and very quickly peeled. The little flakes from the inner balls got in amongst the outer balls, and the whole bearing, when under test, went to pieces in a very few hours. He had never got good results with that bearing.

His own opinion was that the best thing to do when one wanted to use a multiple ring bearing was to make a flexible bearing. In this particular case standard types of bearings were used. Inside the case itself, but outside the rings, a piece of linoleum was put. If there were any tendency to unequal loading this linoleum would "give", and it fairly distributed the load over every ring. There was also less spring in the shaft. There was always some amount of spring in the shaft, causing the outer rings to get more of the load than the inner ones. If the spring were excessive trouble ensued, but by inserting a linoleum liner trouble was entirely avoided. In addition, it was as well to make a spherical seat, so that if the shaft got out of line it automatically adjusted itself, as was done in many ordinary types of bearings. The same thing could be done for thrust bearings. The standard types of thrust rings with heavy cast iron housing could have a piece of linoleum put below it. The spherical seat was also treated in the same way to allow for the maker making it slightly out of truth with its housing.

Excluding Foreign Elements.

In order to exclude dust a sheet iron ring was put round and a small groove made and filled in with oil. It was just as important to keep a ball bearing free from dust as it was to keep an ordinary bearing free from dust. People did not always realize that. Consequently, many bearings, otherwise excellent, went wrong from dust getting into them.

The lecturer then threw on the screen a diagram, Fig. 6, showing a comparison between the friction of an ordinary ball bearing and a bearing of white metal after running for a short time. The load was the same in each case, and the coefficient of friction was stated, while both were running with ordinary lubrication. It would be seen that the effort required to start the white metal or gun metal bearing was enormously greater than that required after running for a time. With the ball bearing the reverse was the case; sometimes it went up, and sometimes it did not. This was an extremely important point in dealing with machinery that was stopped and started very frequently. The white metal bearing with bath lubrication showed an improvement upon the diagram, but in all cases the coefficient of friction of well made ball bearings was considerably lower than that of a shaft running in a bath of oil.

Cost of Production.

In regard to the question of cost, a ball bearing always costs more than an ordinary bearing, but in some cases the total cost of a machine was actually less with ball bearings than with ordinary bearings. Take the case of an electric motor or dynamo. With ball bearings it was possible to have a short bearing 1.5 inches long as against a bearing 15 to 18 inches long if ordinary bearings were used. This meant that the shaft could be shortened, with a corresponding shortening of other parts, with the result that many makers now quoted lower prices for machines with ball bearings than for machines fitted with ordinary plain bearings.

Then it should be remembered that a ball bearing required practically no lubrication—once in two or three months perhaps, simply and solely to prevent rust. If rust could be prevented by any other means a ball bearing would run just as well without oil as with oil. He knew there was a difference of opinion on this point, but he thought he had had sufficient experience to enable him to state definitely that such was the case. It was necessary to be extremely careful about oil. A ball bearing could be easily ruined in a few days or weeks by the use of improper oil, which was likely to set up corrosion. There were certain oils on the market which were quite good. Some time ago he was told that the best qualities of lard oil were probably the best, on the whole, for ball bearings. At any rate, he knew of cases in which bearings had been absolutely ruined by the use of improper oil.

Advantages of Ball Types.

In conclusion, he would say that, with a shafting fitted with ball bearings—properly made ball bearings—it was possible to transmit power more economically than by any other means known. Electrical men might prick

up their ears at that statement, but it was quite easy to transmit power much more efficiently with shafting mounted on ball bearings than electrically. He was quite willing to admit that the electric method, under some conditions, was the more convenient method, but where the conditions were simple then with a shaft mounted on ball bearings very high efficiency indeed could be obtained. Although a great deal of work had been done on the question of ball and roller bearings, there was yet a great deal more to be done, and he hoped in the near future some one would be able to take up this subject and deal with it more thoroughly than he had been able to deal with it.

Perhaps it would be interesting, before closing, to give a formula for calculating the maximum working

load on a ball bearing. The formula was $\frac{K m d^3}{N D + C d}$ where

m = the number of balls in the bearing.

d = diameter of the balls in inches.

N = revolutions a minute.

D = diameter of ball race, diameter being taken from the point of contact of the ball with the race, or for a thrust bearing D = the diameter taken from the centres of the balls.

The constants C and K are as follows:

For Thrust Bearings.

	C	K	
Flat races 200		500,000	when the radius of the race is about twice that of the ball.
Hollow races 200	from 1,000,000		to 1,250,000 when the radius of the race is .5625 that of the ball.

For Journal Bearings.

	C	K	
Flat races 2,000		1,000,000	where the radius of the race is about twice that of the ball.
Hollow races 2,000	from 2,000,000		to 2,500,000 where the radius of the race is about .5625 that of the ball.

Some makers' lists gave higher loads than that formula gave, but all he could say was that whoever worked to the formula he had given would not have trouble. He was not prepared to say that if they worked to some makers' lists they would not have trouble. Some lists were very much too high. He knew that from actual tests of their bearings, and he knew that if they worked from his formula they would be safe.

Formula for Calculating Loads.

A number of questions were asked upon points contained in the lecture. One of these had reference to the way in which D in the formula was measured. Prof. Goodman said he had many shots at that formula before he could get it into a satisfactory form. Sturtevant, who had worked in Germany, published an expression 10 or 12 years ago, in which the speed of the shaft did not come in at all. From the very earliest experiments he (Prof. Goodman) made he found that the speed of the shaft was most important, and the first attempt at getting at an expression for a safe load for a bearing was purely in terms of speed of the shaft. He found, however, that there was a weak spot in it. To get at the result desired he had a series of collars threaded on to a shaft, and in all cases the same number of balls were used with the same load on every bearing, but the diameters of the ball races were different. It was always found that the balls on the biggest diameter of ball race failed first, and then those on the next biggest, and so on, clearly proving that it was the speed of the ball itself and not the rotations of the shaft that was the most important point. Thus he introduced D . It was purely an empirical formula, but it had a theoretical basis. After carrying out a very large number of tests on different bearings the difficulty was to bring them all into line. After plotting some hundreds of tests it was found that a curve could be drawn which very nearly fitted the results. That curve, which was published in the proceedings of the Institution of Civil Engineers, represented many years of work.

He described how he had designed an adjustable ball bearing, which had proved quite satisfactory. On a shaft he put three ordinary ball bearings side by side,

and provided the middle one with a fine threaded screw which could be tightened to make the necessary adjustment. In unskillful hands, however, the bearing might be ruined in five minutes. In further reference to the radius of the ball race, he said the first tests were made on a flat race, i. e., one of infinite radius. Then a series of tests were made on grooves twice the radius of the balls, and he gradually worked down until the last series of tests were made on a groove .5625 the diameter of ball. He invariably found that as the radius of the groove went down, or the better the groove fitted the ball, the higher was the load carrying capacity, but the higher also was the friction. There was no question about that. The lowest friction of all was obtained with per-

fectly flat or perfectly cylindrical surfaces, as the case might be, but, as before stated, the load carrying capacity was smaller. The investigations of others have also shown that the closer the fit between the groove and the ball the higher was the load carrying capacity on the bearing, but that there was more friction. The load carrying capacity of a bearing varied as the square of the diameter of the balls when the speed was constant. That was approximately, though not rigidly, true. It applied to balls of about one inch in diameter. Balls of four inches diameter, for example, would not carry twice as much load as balls of two inches diameter, because the four-inch balls would not be hardened, proportionately to their size, to so great a depth as the smaller ones.

AN ENTHUSIASTIC MOTORIST.

Bought His First Machine in 1899 and Has Driven 225,000 Miles Since Then.

C. M. Kimball of Winthrop, Mass., purchased his first automobile, a steamer, in 1899, and has purchased 18 cars since then. In the 14 years he has driven automobiles 225,000 miles.

He was one of the first to become interested in the Stutz machine, when it was first put on the market by the Ideal Motor Car Company, now the Stutz Motor Car Company, of Indianapolis, in 1912. He has purchased a car of that make each year since and recently took possession of his 1914 Stutz Bearcat model. He says:

In the two years I have been driving Stutz cars, I have covered about 25,000 miles, and am very happy to say that I have not had any mechanical trouble; have never met with any kind of an accident, and have driven one of these machines 5000 miles without a puncture. On one set of tires I got a mileage of 8000.

Recently, I left Winthrop for Portland, Me., starting at 10 in the morning, and returned the same day, arriving in Winthrop at 6 in the evening, and covering about 230 miles. On this trip, as on most of my trips, I managed to get 15 miles to the gallon of gasoline.

OAKLAND WINS IN URUGUAY.

Two of the Three Cars to Finish in Annual South American Classic.

The Oakland Motor Car Company, Pontiac, Mich., is in receipt of a cablegram from Johnson Martin, manager of the Oakland branch in Montevideo, Uruguay, stating that two Oakland cars finished in their respective classes in the annual Montevideo cross country race held last month. The cablegram bears date of Jan. 28, and reads as follows:

In the Montevideo cross country race, Oakland model 43 wins first place in class A. In class B Oakland 6-60 second. Owing to terrific strain put upon entries only three cars finished.

This race is the annual South American classic, and the course is from Montevideo, on the coast, to the town of Salto, in the northern part of the republic. It is a non-stop contest, covering approximately 400 miles, and the cars are

driven day and night. Two of the principal rivers, Santa Lucia and the Rio Negro, and a number of smaller streams are crossed, some by ferry and others by means of fords.

This is not the first time the Oakland has been successful in South American events. It finished second in the 1913 race over the same course, and was first in the recent Rosario race in Argentina.

HOW TO GET TIRE MILEAGE.

Goodyear User Makes Some Interesting Suggestions for Motor Car Owners.

Dr. Thomas Hubbard, Toledo, O., has obtained 10,000 miles from the Goodyear tires on the rear wheels of his car, and his front Goodyears already have been run 13,000 miles and are still in fair condition. In a recent letter to the maker, the Goodyear Tire & Rubber Company, Akron, O., Dr. Hubbard offered the following summary of "the essentials of conservation of tires" as developed by his experience:

1—Uniform inflation, depending upon the load carried. Average, 60 to 65 pounds front, and 70 to 75 rear, for car 2300 to 2400 pounds, properly tired.

2—Test tires every three days. Discard an inner tube that leaks enough to lower pressure 15 pounds or more in less than three days.

3—Drive car steady and true. Slewing and skidding are evidences of bad driving, just as much as allowing a horse to stumble or fall is evidence of unskillful horsemanship.

4—Dashing, brilliant driving—that is, quick headway and a hard brake stop—is destructive to tires, just as a "crack the whip" start and sudden stop ruins horses' tendons and ankles.

5—Never twist a stationary tire on rough surfaces. This refers particularly to turning the front wheels, but the rule is applicable to the rear tire in starting and stopping.

6—Plug small cuts down to the fabric to prevent rotting and sand separation of the tread.

The Kissel Motor Car Company, Hartford, Wis., is in receipt of a letter from J. B. Carnes of Canton, O., in which he states that his wife thinks so much of their KisselKar 6-48 machine that she has been driving it every day this winter in preference to her electric. The Kissel company considers this one of the highest compliments that could be paid to a gasoline motor car.

MECHANICAL NOTES FOR OWNERS.

Outlining Components of Bosch DU4 and ZR4 Dual and Independent Magnetos and Hints for Adjusting Interrupter Mechanism---How to Test for Troubles.

BOSCH magnetos are standard equipment on a large number of 1914 cars, and while they require little or no attention other than an occasional oiling, a knowledge of their construction, operation and adjustment will be of distinct value to the owner in the event of trouble. After considerable service the break of the contact points may require attention or adjustment and to perform this work easily and successfully, one should be familiar with the components of the interrupter mechanism. Lack of space prevents giving specific instructions as to all types of Bosch instruments, but a description of the DU4 dual and ZR4 will enable one to deal with other models, as the principle involved is similar.

Both of these instruments are of the true high-tension type; that is, their armatures have a double winding, resulting in a high-tension current being produced in the magneto itself. When utilized in this form they are termed the independent type, so named because of the fact that a separate coil is not required to transform the primary current generated by the magneto.

The dual form, such as the DU4 and ZR4, which are also constructed for service with multi-cylinder motors, are also true high-tension magnetos, but employ two interrupters, which operate separately and distinctly from each other. One serves to interrupt the primary current generated by the magneto and the other breaks that supplied by the dry cells.

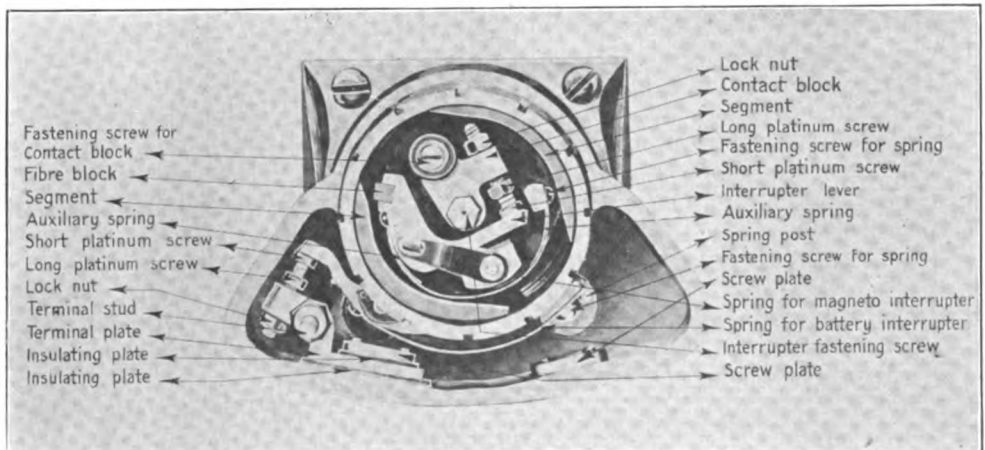
The term dual ignition is generally utilized to convey the impression that there are two sources of current available, and when employed in such manner is correct. In the simplifying of the automobile it has become general practise to use but one set of spark plugs, and although single ignition is growing in favor, many makers still

retain the dual ignition, but do not equip the cylinders with more than one set of plugs.

Formerly, and before the magneto was constructed to provide for the interruption of both its primary current and that of the battery, a commutator and coil were used with one set of plugs, and a magneto for the second set. This made for a network of wires, in that with a six-cylinder motor there was necessary 12 high-tension cables, six timer wires and those connecting the battery to coil, as well as the primary connections of the magneto.

Utilizing One Set of Plugs.

The development of the dual system eliminated the multitude of wires to a certain extent and has made possible the use of two separate



Dual Contact Breaker Used on Bosch DU4 and ZR4 Magnetos, Showing Components Utilized in Adjusting Break of Contact Points.

sources of current with only one set of plugs. This is made practical by employing the interrupter mechanism of the magneto in place of the commutator, and the distributor to distribute the high-tension current to the plugs. The Splitdorf instrument described in the last issue illustrates the point involved.

Independent Types.

The independent type, such as the Bosch ZR4, for example, is included under the head of single ignition, in that the instrument is utilized for starting as well as operating. It is the simplest form of ignition, in that there are but four wires leading from the distributor to the spark plugs, and one low-tension connection, that utilized

for grounding the primary current. This grounding diverts the primary current from the secondary winding and is accomplished when the switch lever is moved to the "Off" position. As previously pointed out, the single ignition is growing in favor because the general adoption of electric motor starters relieves the owner of cranking.

Components of Breaker Box.

If the novice will bear in mind the fact that the primary circuit of the magneto must be interrupted at a predetermined instant, and the break is timed practically in the same manner as in the commutator of the battery and coil system of ignition, the work of setting and timing magnetos will be greatly simplified. With the commutator, contact is made and broken between its roller and a metal block, closing and opening the primary circuit. With the magneto

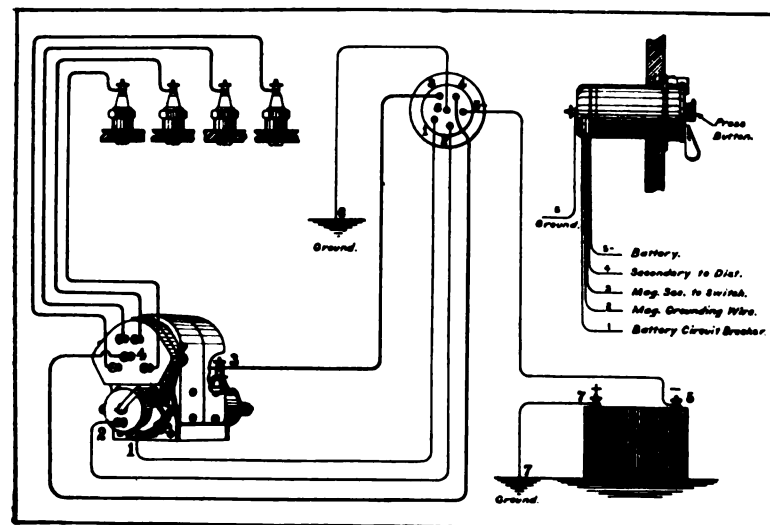
lever comes in contact with either of the two segments in the housing. These segments depress the lever, breaking the contact between the points, which is normally maintained by the tension of a spring. While it would appear when watching the action of the parts that the points do not separate at all, they do very slightly—in the case of the Bosch instrument about .015625 inch. This is the proper distance to be maintained.

Adjusting the Points.

The Bosch points are adjusted by loosening the locking nut of the long screw with the wrench provided for this work, and rotating the long screw to the right to decrease the break, and to the left to provide a wider space. The Bosch wrench includes a steel gauge, a thin strip of metal, which is inserted between the points. It should be a slightly snug fit. This measuring should be performed when the fibre block is in contact with the segment, for in this position the points will be separated.

The components of the battery interrupter are shown beneath the magneto interrupter, and are contained in a separate housing. This construction is utilized with the Bosch DU4 and ZR4, also six-cylinder instruments of the same design. Were it not for the fact that a cam is fitted to the armature shaft for breaking the contact of the points, and the same set of spark plugs and switch utilized, the arrangement could be termed a true independent system.

When the switch lever is moved to the "Battery" side, the primary current of the magneto is ground-



The Wiring Plan of the Bosch DU4 System.

the interrupter mechanism performs the work, two platinum points making and breaking contact.

Operation of Interrupter.

The components of the Bosch dual contact breaker being shown, and, eliminating for the time being the parts employed for the battery circuit and studying those contained in the circular shaped housing, the operation will be easily understood. One of the best methods is to remove the breaker box cover and have some one crank the motor slowly while the working of the parts is noted.

It will be seen that the parts marked "long and short platinum screws" in the illustration, comprise a fixed member and a movable one. The long is fixed, but the short is moved away from it when the fibre block of the interrupter

ed. The battery current is led to the lower interrupter mechanism; is next transformed into a high-tension by a coil, and is conducted by a cable to the distributor of the magneto. Here the secondary current is distributed in the usual manner.

The battery interrupter of the ZR4 magneto is shown, but that employed with the DU4 dual instrument is similar, differing only in that the adjusting screw is located outside of the housing. The adjustment of the points is made in the same manner as with the independent type, but the distance or break of the points is slightly larger.

Wiring Plan.

The wiring plan of the DU4 dual magneto is shown in sketch, and connections are practically the same for the ZR6, differing in that six secondary cables are employed between the dis-

tributor and the spark plugs, and that two high-tension leads are employed between the switch and the magneto. The independent magneto requires but one switch wire in addition to the spark plugs leads, but in the dual system there are four connections between the switch and the magneto.

Two of these are high-tension, consisting of wire No. 3, by which the high-tension current from the switch is led to the switch contact, and wire No. 4, by which the high-tension current from either the magneto or the coil goes to the distributor. Wire No. 1 is a low-tension, and conducts the battery current from the primary winding of the coil to the battery interrupter. Low-tension wire No. 2 is the grounding wire by which the primary circuit of the magneto is grounded when the switch lever is moved to "Off" or to the "Battery" position. Wire No. 5 leads from the negative terminal of the battery to the coil, and the positive terminal of the battery is grounded by wire No. 7. A second ground wire is employed, the No. 6, it being connected to the coil terminal.

These terminals are plainly marked on the back of the coil and are accessible by removing the cover plate, which is retained by a knurled screw. By following the wiring plan a novice can remove and replace the wires without trouble and correctly.

The operation of starting with this form of coil does not require any explanation to its users, nor is there any attention required. If the battery is in good condition the wires properly attached and the contact points properly set, failure to operate on the battery side will require the services of an expert. The owner should not attempt to dissect the coil to see how the parts are assembled. It will not give trouble if properly used.

Detecting Faults.

If the motor operates properly on the magneto and misses on the battery side, it will usually be the fault of the battery. If the latter is in good condition, remove the battery breaker cover and note if the lever works properly and the points are clean and have the right break. The coil may be tested by disconnecting the No. 4 wire from the magneto and throwing the switch lever to the "Battery" side, operating the press button with the terminal of the wire held about .03125 inch from the metal of the motor. If the coil is not at fault, a spark will jump the gap. If this test fails, displace the No. 3 wire and repeat the experiment. In the event of serious trouble it is best to have the switch and coil ex-

amined at a Bosch service station, or inspected by an expert.

Testing Magneto.

Missing when operating on the magneto is generally due to a faulty plug or broken down insulation of the secondary cables. Too wide a gap may cause missing at low motor speeds and the space should be maintained in accordance with the instructions of the maker of the car.

Relative to the care of the distributor: There is little to be done other than to clean it with a soft, dry brush. Oil should not be utilized. The only place requiring lubrication is denoted by the word "Oil", and the owner should use judgment, employing a few drops every 1000 miles. Too much oil will invite serious trouble.

ANOTHER CASE IN COURT.

Judge Orders Cash Paid for Stock Returned to Man Who Made Investment.

As was pointed out recently in these columns, it is unfortunate that the great public interest in cyclecars appears to afford opportunity for business practises which have little place in an industry of the character and importance represented by the manufacture of automobiles. Another example is brought to light in the recent court action against Andrew De Schaum in Detroit, as a result of which Justice Richter ordered De Schaum to return \$500 to Joseph Koplitzki, who had invested it in so-called syndicate stock of the Automobile Cyclecar Company.

It was brought out that the company had not actually been organized, and the defendant insisted that he had not sold shares therein, but membership in the syndicate. On the witness stand, De Schaum testified that in his office he had material for six cars, but a personal investigation by Justice Richter failed to convince the court. It is stated that the transaction in question took place before the so-called "blue sky" law in Michigan went into effect in August.

Mitchell May, secretary of state in New York, estimates that there are in use throughout the world some 2,000,000 automobiles. He claims to have secured statistics from reliable sources which lead him to believe there are 1,127,940 cars in the United States, 425,838 in Great Britain, 273,511 in Europe and 92,500 in all other countries.

The Goodyear Tire & Rubber Company, Akron, O., maker of Goodyear tires and inner tubes, added 2500 men to its payroll Jan. 1.

IN THE COMMERCIAL VEHICLE FIELD.

Philadelphia Fire Department Needs Motor Apparatus--Features of Adams Truck Chassis--Interesting Trailer and Dumping Body Equipments.

AS A RESULT of a careful and detailed investigation, covering a period of 15 months, George D. Porter, director of public safety in Philadelphia, Penn., feels that he is compelled to report to the mayor and city councils that the fire department apparatus is in an antiquated condition, and that it is from five to 10 years behind that of many other cities. He maintains that \$2,870,000 is needed to modernize the department and bring it to an equal footing with other cities of the size of Philadelphia.

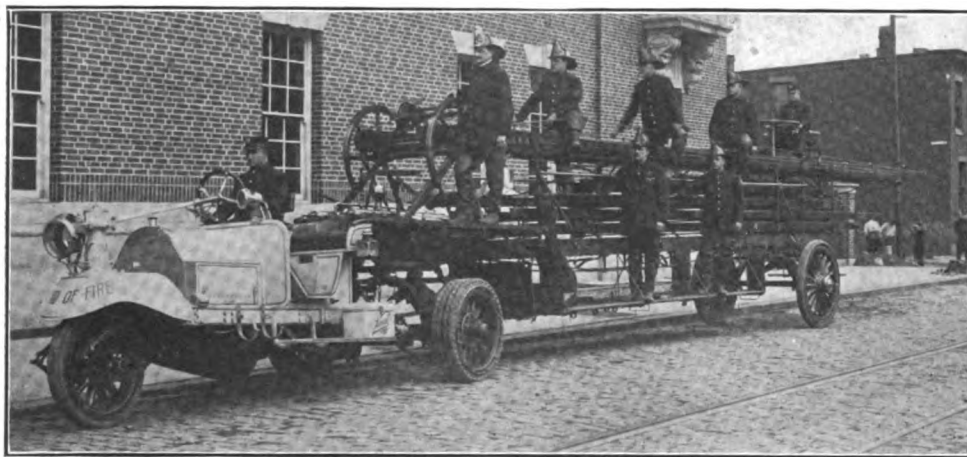
It is not the plan of the director, as set forth in his official report, to expend this sum at once. It is probable, however, that manufacturers of motor driven fire fighting equipment will have opportunity to bid on about \$600,000 worth of

There are 16 aerial trucks, of which one is of modern construction. Of the large number of combination hose wagons, nearly all are reported in bad condition, and only two are motorized. There are 14 fuel wagons, or tenders, all of which are horse drawn, and a majority are held to be beyond repair. Director Porter has recommended that these be replaced by motor trucks.

ADAMS TRUCK CHASSIS.

Constructional Features of a Line Produced with Three Capacity Ratings.

The Adams Bros. Company, Findlay, O., which has had long experience in the manufacturing field, and has been building Adams trucks for a number of years, is now producing these vehicles with load capacities of 2000, 3000 and 4000 pounds. The three chassis are practically identical in design and construction, except for the dimensions of the components. The accompanying illustration presents the one-ton model, and



Knox-Martin Tractor in Service with the Philadelphia Fire Department.

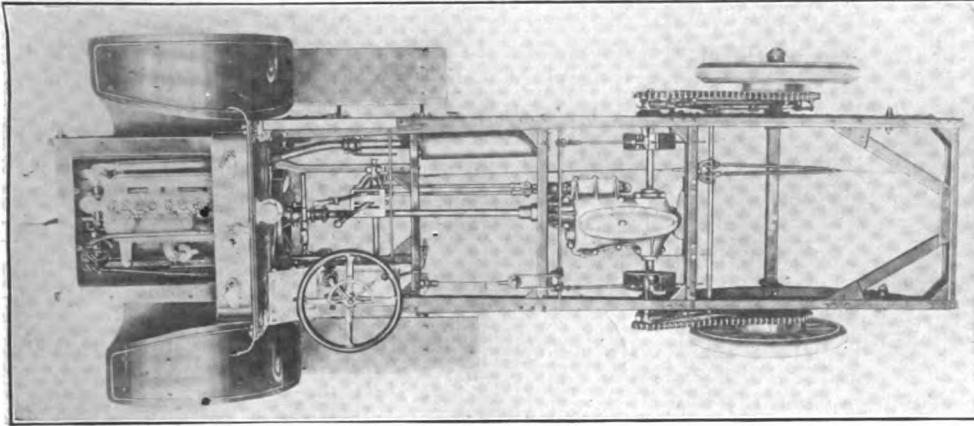
work in the near future. Mr. Porter has received the assurance of Chairman Connelly of the councils' finance committee that the appropriations requested to put the fire department on an up-to-date basis, in point of equipment and other necessary features, will be passed without any objections from the councilmen.

The recommendation of the director is that 34 of the old style fire engines be replaced immediately by motor driven pumping apparatus. He shows that the need for these is very acute, and estimates that the cost of this equipment will be about \$350,000. The total value of apparatus now in use is placed at \$246,933.50, of which the motor driven equipment is represented by \$66,189. There are 17 motor vehicles now in service,

a description of it will apply to the others, with the exceptions noted.

The motor is a Continental, of the water-cooled, four-cylinder, L head type. The cylinders are cast en bloc, with a bore of 3.75 inches and stroke of 5.25, giving an S. A. E. rating of 22.5 horsepower, although it is conservatively rated by the maker at 30. The two larger machines utilize the same motor, which has bore of 4.125 inches and stroke of 5.25, giving a rating of 27.25 under the S. A. E. formula. The maker's rating is 35. Lubrication is by plunger pump and splash, cooling is by centrifugal pump, ignition by an Eisemann magneto and the carburetor is of the automatic float feed type.

The clutch is a dry disc type, and this is



Plan View of One-Ton Chassis, Produced by Adams Bros. Company, Findlay, O.

mounted with the engine in a sub-frame. The transmission gearset, which affords three forward speeds and reverse, is assembled with the jackshaft and is supported at three points. Final drive is by side chains. Both axles are of the Timken manufacture, the front member being an I section and the rear rectangular.

The frame is a pressed steel channel section five inches wide, and is supplied with numerous cross members and sturdy gusset plates and braces. The forward end is necked in to permit full swing of the wheels in steering. The radiator is mounted in front of the dash, a type of construction which has been followed consistently by this concern from the first. The springs are semi-elliptic throughout. The service brake is contracting on the jackshaft, and the emergency expanding on the rear wheel hubs.

The one-ton machine has wheelbase of 121 or 136 inches and tread of 56. The front wheels are fitted with 3.5-inch, and the rear members with four-inch solid tires. The 1.5-ton wagon has the same wheelbase, and the front tires are 3.5-inch single, while the rear are dual of the same cross section. The two-ton vehicle has wheelbase of 140 inches and tread of 60. The tires are four inches in cross section, single in front and dual in the rear.

The driver is located at the left in each instance, and

the maximum body length back of the driver's seat with 121-inch wheelbase is 108 inches, with 136-inch wheelbase, 132, and 140 inches, 138. The chassis is sold with a seat having capacity for two persons, and the equipment includes oil dash and tail lamps, horn, oil can, tool kit, set of wrenches and jack. Painting can be furnished at the option of the purchaser.

PEERLESS TRUCK AND TRAILER.

General Electric Company Saves Original Cost in First Nine Months of Service.

By the use of a special Peerless truck, made by the Peerless Motor Car Company, Cleveland, O., and a trailer, the National Lamp division of the General Electric Company, has realized an economy equal to the original investment in nine months. The latter company has a glass factory in Niles, O., and the bulbs utilized for making incandescent lamps are produced there. It is necessary to deliver these bulbs at the lamp factories in Youngstown and Warren, and the plants in these cities can only be kept in operation by continuous delivery.

Formerly the bulbs were set by freight, and to



Peerless Truck and Trailer Utilized in Haulage of Electric Light Bulbs.

minimize breakage it was necessary to pack each bulb, wrapping it in tissue paper and placing it in a tray. The labor of packing was considerable, and despite the greatest care many were broken in transit. In addition, there was the freight charge to be taken into consideration. The bulbs are very light, but bulky, and the carload was based on bulk, not weight.

The company decided to experiment with highway haulage, and purchased a special Peerless chassis, with wheelbase of 204 inches. On this a van body was installed, this having inside dimensions of 17 feet eight inches length, seven feet width and eight feet four inches height. This body has outside sliding doors.

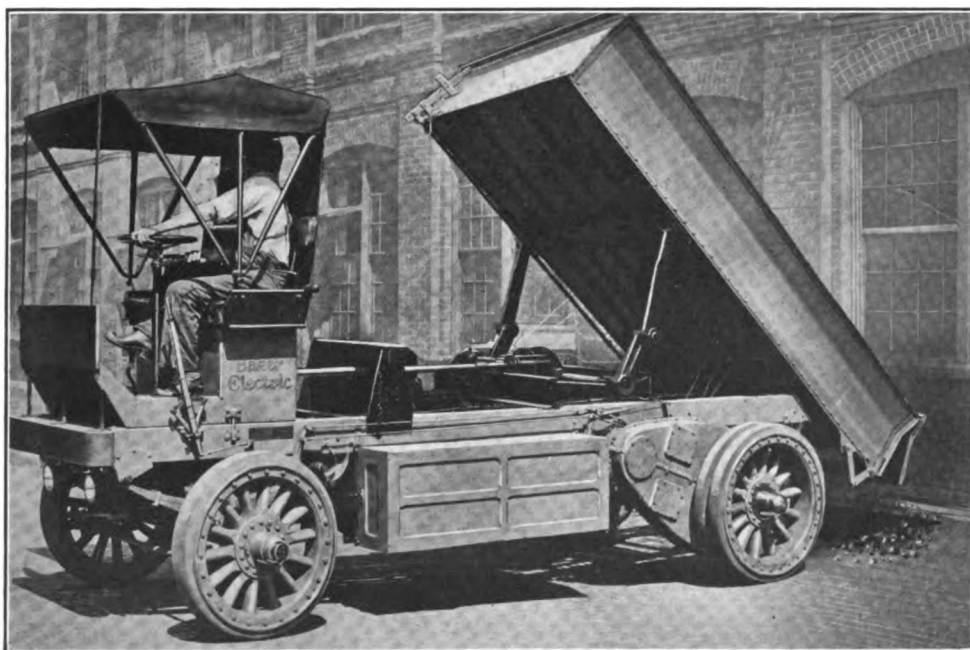
The weight of a load for this body, which will

be very close to that for rail shipments in carloads, but the saving is represented in the elimination of the labor incidental to packing and unpacking, and in the lessened liability of breakage. The roads between Niles and Youngstown are dirt, worn macadam and brick. The average daily mileage is 35, and the load will range from 3000 to 4000 pounds.

BAKER DUMPING TRUCK.

A Body Installation Design for Handling Fuel, Etc., by Electric Machine.

An accompanying illustration presents the quick discharging body designed for use with the standard four-ton Baker electric chassis, built by the Baker Motor Vehicle Company, Cleveland, O. The body can be installed at the option of the purchaser, and is constructed with a frame of angle iron, and sides and ends of steel plates, these members being riveted. The floor is of steel channels covered by steel plate. The tail lever is opened and closed by a lever mounted at the side of the driver's seat.



New Steel Dumping Body Designed for Use with Four-Ton Baker Electric.

hold 1030 cubic feet, was less than a ton, and to utilize the additional power of the motor a trailer was built, this having a frame of channel angle iron mounted on springs and truck front and rear axles, the wheels being of standard size and shod with solid tires. The trailer is controlled by a drawbar or pole, that has a short arm or lever that is linked to the chassis frame, with a longer lower arm pivoted on the front axle connected with the centre of the tiebar that extends across from the tail levers on the front wheel pivots. On this trailer was installed a body of the same size as that on the truck chassis. The combined capacity equals that of the average box freight car.

The actual cost of haulage has been found to

be by hand or by motor. The body can be elevated to an angle of 45 degrees, and is hoisted by means of two arms secured to the sides below the floor. These arms are actuated by a large steel cross shaft that is installed transverse of the chassis frame, and revolves in one direction only. Two-thirds of one revolution is required to elevate the body, and the other third will lower it.

It will be noted by study of the illustration, that the body is hoisted by a shaft extending longitudinally of the chassis. This carries a worm that meshes with a worm wheel, which in turn drives a train of reduction gears that actuate the cross shaft. This shaft is amply lubricated, the bearings being in oil tight housings,

and it may be driven by an auxiliary motor, supplied with power from the battery, or it may be turned by hand.

Sizes of standard bodies for handling differing materials are: Coke, 11 and 14 feet length, four and six feet width, and three feet height; coal, 10 and 14 feet length, four and 4.5 feet width, 1.5 and two feet height; sand, 10 and 14 feet length, four feet width, one and 1.5 feet height. The last dimension includes three-inch flareboards.

CONSIDERING TRUCK COSTS.

A Statement of Present Conditions Presented by an Engineering Expert.

The communication presented below is submitted to the consideration of business men who may be interested in the subject of motor truck haulage. The writer is Walter M. Curtis, manager of the engineering department of the New England Audit Company, Springfield, Mass.:

Before the advent of the motor vehicle for commercial use, very few business concerns took the trouble to find just what their trucking charges amounted to. Inasmuch as the horse was the only means available for the purpose and had to be fed anyway, whether working or not, there was comparatively little inducement to separate the teaming cost from other expenses. Occasionally a concern might wish to know whether it would be cheaper for it to maintain its own teams or to put out its trucking on contract, but this was practically the only incentive for watching the trucking charges closely.

The advent of the motor vehicle and the necessity of intelligently considering its adoption to their own particular line, awoke business men to the importance of knowing what their trucking was costing them. It called for more than this, for other considerations were involved, such as the advertising value of a motor vehicle, effect on customers, advantage over competitors, stimulation of trade, etc. Disregarding these latter features, however, the great problem confronting business concerns has been to secure a reliable basis upon which to compare the two systems from a cost standpoint.

Although it may not be possible to give actual figures on the saving a motor system can effect in any particular instance without a special study of the peculiar conditions involved, I have found it entirely practical to make an analysis of the proper charges to be taken into account in both horse and motor vehicle trucking methods in various lines of industry. These charges fall naturally into two classes—fixed charges and operating charges. In the former are placed interest, insurance of all kinds, drivers' wages and garage charges. In the latter, depreciation, gasoline, oil and grease, tires and general maintenance.

By a careful study of much of the reliable data obtainable on these subjects and an analysis of the results in accordance with the above general classifications, I have found the following to be very clearly apparent: First, that there is a decided advantage in the use of motor vehicles of large capacity whenever the nature of the load is such as to make a large tonnage possible; second, that there is a corresponding reduction in the cost a ton-mile with an increase in the daily mileage; third, that it is of the greatest importance to eliminate as much idle time as possible in the use of motor vehicles; fourth, that rubber tire expense is a large direct operating charge in the case of the regulation motor truck; fifth, that a comparison of the charges against the tractor type of motor vehicle with those against the large regulation motor truck shows a distinct economic advantage for the tractor for many purposes, due

mainly to the following reasons: Larger capacity at a less investment cost, less strain and consequently less damage and maintenance to vital parts for the same tonnage, also less tire expense due to use of steel tires under the greater part of the paying load.

With these conclusions in mind, it should not be difficult for a business man to judge with some degree of accuracy, whether or not a motor truck or a tractor would be of value in solving his own particular hauling problem. He could then obtain outside expert advice in arranging the details of his case if he felt it necessary. In many cases a rearrangement of the shipping facilities would make it possible to use a motor vehicle to great advantage, when under present conditions it could not be worked to a proper capacity. Even where no great financial saving can be effected, as in some cases of short haul work, the motor vehicle is a good asset from an advertising standpoint—it invariably tends to increase trade and pleases customers by more prompt and efficient service.

Some time ago I had occasion to render a report upon trucking costs to a client, a prominent eastern manufacturer. This report later appeared in printed form and an idea of the widespread interest in this subject at the present time can be gained from the frequent requests received, according to a recent communication, for copies of this report, indicating that business men are rapidly becoming educated to the importance of giving careful attention to their trucking problems.

WHY KEEP TO THE RIGHT?

Some Historical Reasons for the American Custom in This Respect.

With the more general adoption of left hand drive in this country, motor car manufacturers are beginning to give special attention to the reasons which first impelled Americans to keep to the right, instead of the left, as in European countries. The matter was brought up in the factory of the Moon Motor Car Company, St. Louis, Mo., recently, because of the number of orders coming from abroad, in which it was specified that the car should be fitted with right hand drive.

Stewart McDonald, vice president of the Moon company, has been delving into the history of this matter, and explains the situation as follows: In Europe, in the days of the spear and sword, a horseman kept to the left in meeting anyone, in order that he might have his adversary, if such he proved to be, on the free or right side. In this country, horseback was the first general mode of travel, and in meeting an adversary the horseman kept to the right in order to have the enemy on the protected side, the horse's body and neck forming a shield and his own body protecting his gun arm.

The L. W. Rinear Company, Cleveland, O., discontinued its advertising office in that city Feb. 1, and of the men connected with the company, Mr. Pierce and Mr. Rinear will continue their work through the Miller Agency Company of Toledo, O.

ACETYLENE AS AN EMERGENCY FUEL.

OPERATING the motor on acetylene when the fuel has become exhausted, and starting the engine when cold by priming the intake manifold have been accomplished by motorists and the methods utilized have been outlined in these columns. The Prest-O-Lite Company, Inc., Indianapolis, Ind., maker of Prest-O-Lite tanks, has received many reports from owners who have made emergency use of acetylene as a fuel, and in some instances considerable mileage was obtained from a 40-foot capacity tank. One of the four-cylinder cars from the Prest-O-Lite garage was employed on the Speedway track, and it ran 11 miles at a rate of 22 miles an hour with one 40-foot supply of acetylene.

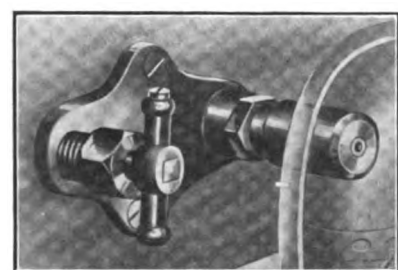


Fig. 1—Prest-O-Primer Valve for Emergency Fuel.

About a year ago the Prest-O-Lite Company brought out the Prest-O-Primer for aiding motor starters. The outfit included an automatic reducing valve for the tank, a line to the dash, and a push valve convenient to the driver. Operating the valve admitted acetylene to another pipe connected with the intake manifold. Releasing the valve shut off the supply. To prevent leakage an extra needle valve was incorporated in the dash control. The operation of the system was simple. The low pressure acetylene was drawn in in the conventional manner, and the mixture was fed until the engine became sufficiently warm to operate under the regular fuel.

The acetylene mixture being readily combustible, starting was assured in low temperatures. The Prest-O-Lite Company states that many motorists whose cars were not equipped with motor starters have attempted

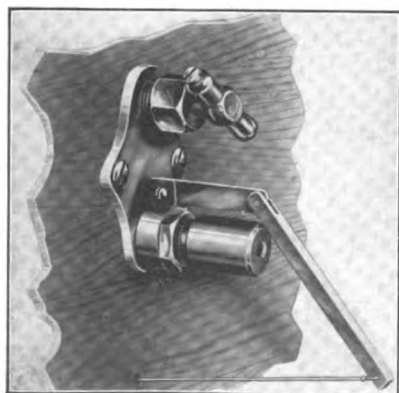


Fig. 2—Prest-O-Primer Used with Hand Cranking.

alterations to the primer, changing the construction so that the gas would flow while they went to the front of the machine to crank. This is not recommended by the company, as careless operators are apt to forget to shut off the supply, even after completing the trip. The combustible nature of acetylene is such that accidents might ensue through neglect.

The Prest-O-Lite Company has brought out a device for the benefit of those who crank their motors and who use the primer. The arrangement is shown at Fig. 2 and consists of a lever attachment to the dash valve. A wire leads from the lever to the front of the car, enabling the driver to operate the primer while he spins the motor much in the same manner as the butterfly valve of the carburetor is held closed when a rich mixture is desired. The dash valve is held open by the wire until the motor has become warm. Releasing the wire automatically closes

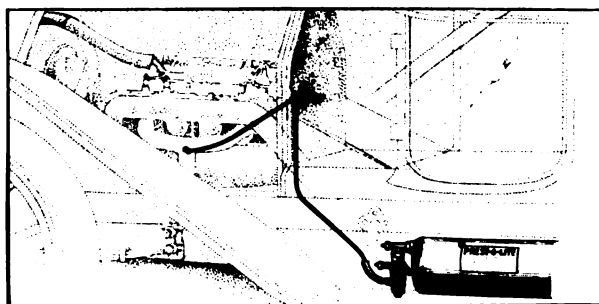


Fig. 3—Showing the Installation of the Prest-O-Primer, Permitting of the Use of Acetylene for Starting and Operating.

the valve. In connection with the device the company states that better results will be obtained by closing the butterfly valve of the carburetor, and suggests that the motor be run a few seconds on acetylene, then the supply shut off and note if the engine operates on gasoline. If not, the dash valve is opened until the desired results are obtained.

It is important to retard the spark, especially if the motor is to be started on the magneto, as the acetylene mixture ignites much more quickly than gasoline, and the company states that this holds true in cold weather.

Relative to the use of acetylene as an emergency fuel: Fig. 1 shows the use of the dash Prest-O-Primer. It is easily operated, the driver pushing in the valve plunger by the foot, which permits acetylene to flow to the intake manifold. The motor will continue to operate on acetylene as long as the valve is pushed in and until the

supply is exhausted. The spark should be retarded, and the company states that it should be remembered that, as the gas pressure is constant, the richness of the mixture must be controlled by the opening of the throttle, thus admitting more air through the carburetor. It is also stated that it is a simple matter to ascertain the correct throttle positions under all conditions of operation.

The use of acetylene for cranking or as an emergency fuel does not interfere with the lighting, as a two-way union is attached to the tank, so that one branch will run to the lights and the other to the priming device. When so used the gas is turned on at the tank, a separate valve being provided for the lights, and the gas for the priming device is controlled by the dash members.

TO LOCATE IN NEW HAVEN.

Westinghouse Air Spring Company Said to Have Secured Plant in That City.

The Westinghouse Air Spring Company, which has had temporary offices in New York City, is said to have purchased the shop of the U. S. R. F. G. & P. Company in New Haven, Conn., where it will locate its factory for the production of Westinghouse air springs for automobiles. It is understood that formal occupation of the plant will be made within the near future.

For some little time past, the air springs, which are in the nature of a shock absorbing device, have been made in a small shop in Ansonia, Conn. The workmen and machinery employed in that city will be removed to New Haven, under the plan as made public.

FLYING MERKEL NEWS.

Several Changes in Personnel of Men Who Help Sell Well Known Motorcycle.

On account of the rapidly growing business of the Miami Cycle & Manufacturing Company, Middletown, O., maker of Flying Merkel motorcycles and a number of well known brands of high grade bicycles, it has been found necessary to reapportion the districts in the United States. This has resulted in a number of changes in the personnel of the sales organization of this concern.

E. W. Adams, who has charge of sales on the Pacific Coast, will retain as his territory, Wash-

ington, Idaho, Arizona, California, Nevada, New Mexico, Oregon, Utah, Alaska, Hawaii and British Columbia. O. K. Newby, who has been in the East, and J. E. Steuer, who has been in New England, will assist him.

F. P. Lee, in charge of the central western district, will have as his territory, Wyoming, Nebraska, Colorado, Kansas, South Dakota, Iowa, Missouri and a part of Illinois. Hans Johnson of Dallas, Tex., will handle the Flying Merkel in Oklahoma, Louisiana and Texas, and the Elyes Austell Company of Atlanta, Ga., has arranged for the distribution in the South Atlantic states.

William McKinley Sheets, whose picture is presented herewith and whose record has been so good in the East during the past year, has been promoted to have charge of the sales in Indiana, Kentucky, Arkansas and portions of Tennessee, Illinois and Wisconsin. John Newberry will direct the sales in Michigan, Ohio and West Virginia; W. K. Thomas in Pennsylvania, Mary-



Two Flying Merkel Salesmen: At Right, William McKinley Sheets; at Left, Ralph K. Smith.

land, Virginia and Delaware, while C. A. Vandoren will retain control of the New England territory, with the addition of New Brunswick and Nova Scotia.

A decidedly important acquisition to the Flying Merkel force is that of Ralph K. Smith, for many years with the Pope Manufacturing Company. He will hereafter be known as the eastern district manager for the Miami interests. He was born in Maine, but soon removed to Boston. He spent several years on the road, and went with the Pope company in 1905. With the Miami concern he will have as his territory, New York, Pennsylvania (east of Harrisburg), New Jersey, Ontario and Quebec.

C. W. Siegmund, general manager of the Porto Rico Motorcycle Supply Company, San Juan, Porto Rico, has secured the exclusive distribution rights on that island.

IMPROVED ROADS AND MOTORING LAWS.

American Automobile Association Succeeds in Placing New Jersey Test Case on Docket of United States Supreme Court---Warns Law in Ohio.

MOTORISTS generally will be interested in the announcement that Charles Thaddeus Terry, general counsel of the American Automobile Association, has had placed on the docket of the United States Supreme Court, the so-called New Jersey test case, and it is expected that it will be argued before the year is ended. The case is being handled by former United States Attorney-General J. W. Griggs of Paterson, N. J., who represented the Associated Automobile Clubs of New Jersey during its progress through the state courts.

Several years ago the White Company started a truck from its New York City branch, carrying a load of parts for its branch in Philadelphia, and attempted to cross New Jersey without first procuring a Jersey license. The test case resulted. The Associated Automobile Clubs of New Jersey contended that the registration fee in question constituted a tax which interfered with interstate commerce. The matter eventually was taken to the New Jersey supreme court, which held, in effect, that the fee, which at that time was comparatively low, was not sufficient to constitute a tax, being more in the nature of a fee to provide the necessary funds for the administration of the law, which came within the police powers of the commonwealth.

There the matter was permitted to rest for some time, or until last year, when the legislative board of the American Automobile Association decided to take the case into the federal courts. It will be understood that the question involved is a specific one, and does not include the broader question of double taxation, which was brought in Mississippi and some other states.

THE LAST TOLL ROAD.

Vermont Legislature Seeks to Abolish the Only One in New England.

Steps have been taken by the Vermont legislature to acquire the stock in the only toll road existing in New England, that covering the six miles between Peru and Winhall, Vt. The stretch of road is included on the Ideal Tour from New York to the Berkshires, etc., and has been a source of considerable annoyance to motorists

for some years, not alone because of the necessity for paying toll, but because of the antiquated construction of the road itself, with its numerous "thank-ye-marms."

The road was built in 1815 by Gen. Peter Dudley of Peru, Vt., at a cost of \$5000, and the builder maintained it for 20 years. Later the property passed into the hands of a corporation and for some years a considerable proportion of the stock was held by residents of Peru and Winhall. The shares paid no dividends, and it is stated that the present owner, John J. Flynn, a wealthy contractor of Burlington, Vt., acquired the shares without much difficulty. His first price to the state was \$3000, but it is understood that this has now been advanced to \$15,000.

ON LINCOLN HIGHWAY.

Old Ferry Road in New Jersey Is Oldest Portion of Transcontinental Route.

It transpires that the Essex-Hudson section of the Lincoln highway, in New Jersey, undoubtedly is the oldest portion of the transcontinental route in which the Lincoln Highway Association is interested. It also is believed to have been the most expensive to construct.

This historic highway was established by the Colonial legislature in New Jersey, which called upon "all good people" to "assist in keeping it fit for travel." A public notice in the New York Gazette, June 27, 1865, declared the highway "would run from New-Ark to the public road near the Town of Bergen, leading to the Paulus-Hook and established Ferries over the two small Rivers, Passick and Hankingsack, which makes the Distance from Paulus-Hook to New-Ark eight miles and will be a level and good Road when the Cause-ways are made."

It was first known as the "Ferry Road" because the Passaic and Hackensack were crossed on ferries. After the bridges were built extra heavy planking was laid crosswise on the road, and the name, by which the highway has been known for upward of a century, was the "Plank Road." The present road cost \$1,316,000, of which \$500,000 represents the cost of bridges. The highway is now 100 feet in width, with 10-foot sidewalks on either side, and two 28-foot road-

ways. Trolley tracks are raised 12 inches in the centre.

NO COMPROMISE IN OHIO.

Legislators Seeking to Secure an Agreement with State Association.

The taxation committee of the Ohio house of representatives, which, with the senate, has been called in special session to consider the matter of again passing the Warnes law with changes which will bring it within the constitutional limitations, has invited representatives of the Ohio State Automobile Association to a conference in order to learn if it is possible to effect a compromise. Two propositions are being considered by the legislators, one of which provides a flat rate of \$6 a car, and the other, a sliding scale from \$5 to \$10, based on the horsepower rating. The association objects to the latter.

It is understood that the motorists will decline to compromise with the legislature, reserving the right to attack any law in the courts. As a result of declaring the Warnes law unconstitutional the state registrar of automobiles has laid off all of his force except one deputy. All remittances received for 1914 tags, before the court decision was handed down, have been returned, and at present there is no registration law in Ohio.

TO WELCOME TOURISTS.

Massachusetts Expected to Repeal 10 Days Clause in Existing Law.

The state highway commission in Massachusetts has suggested to the legislature now in session that it would be quite proper to repeal that section of the motoring law which states that a non-resident may not stay within the borders of the commonwealth more than 10 days without being required to register his car. As a matter of fact, this has been somewhat in the nature of a dead letter in many instances, while in others it has been rigorously enforced. There seems to be a fair probability that the action suggested will be taken.

The Automobile Legal Association also has filed a petition to amend the registration law, so that the fee may be reduced 25 per cent. on cars registered between April 1 and June 30, 50 per cent., between July 1 and Sept. 30, and 75 per cent. between Oct. 1 and Dec. 31. The present reduction is 50 per cent. after Oct. 1. The

association maintains that, inasmuch as the purpose of the law seems to be to remunerate the state for alleged damage done to the highways, it should follow that one who uses the highways for nine months does not do as much damage as one who uses them the entire year.

CHOOSES PREMIER CAR.

Vice President Westgard of National Highway Association on Another Trip.

A. L. Westgard, vice president of the National Highway Association, which has its "workshop" at South Yarmouth, Mass., has returned from an 18,000-mile trip in the interests of that association, and is about to leave on another journey of 20,000 to 25,000 miles. Every character of road will be traversed; all the great mountain ranges will be crossed, and in many sections roads will be attempted over which no automobile has yet been driven.

Mr. Westgard has crossed the continent six times, besides making a large number of trips from the Lakes to the Gulf. On most of these trips he has utilized a Premier car, made by the Premier Motor Manufacturing Company, Indianapolis, Ind., and he has made selection of one of these machines for his forthcoming journey. Concerning this make of machine he has the following to say:

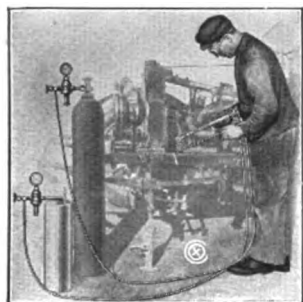
I use a car that will run continuously under all sorts of conditions of apologies for roads and weather, without any thought of trouble. Frequently, I flounder through seas of mud, hundreds of miles from nowhere, and, the next day, climb hills that would break the heart of the ordinary automobile. Good roads? That's what we hope to get. If we had them perhaps something besides the Premier might serve me, but while I still am rambling about the country blazing the trail, I will pin my faith to Premier.

The Aero Club of America announces that it will co-operate with the management of the Panama-Pacific exposition in arranging plans for an aeroplane race around the world, to start from the exposition grounds in San Francisco in May, 1915, and to be completed within 90 days. The first prize will be \$100,000.

The fourth annual automobile show of the Tiffin Daily Advertiser will be held in the Junior O. U. A. M. auditorium, Tiffin, O., March 4-7, under the management of E. T. Rogers. Every effort will be made to make this show "prettier than ever", and the local dealers will practically all be represented.

MACHINERY, TOOLS, EQUIPMENT AND SUPPLIES.

THE Cox Brass Manufacturing Company, Albany, N. Y., has brought out the Cox combination welding and decarbonizer outfit, which, as the name implies, provides an equipment



Cox Welding Equipment in Service.

for removing carbon by the oxygen process and for welding broken parts. It has several advantages, the most prominent of which is, perhaps, the saving of time. Ordinarily the work is sent outside, which generally results in delays, and, in addition, the profit accruing to the garage man is very small, this usually being a percentage. And it sometimes happens that a small repair is desired in a hurry by the customer and that the welding company is not able to handle the work.

With the Cox outfit the welding work may be performed quickly by the repairman, and the company states that the operation of the equipment can be learned in a very short time by the average mechanic. One of the qualities emphasized by the apparatus is that it will do the work thoroughly, welding broken parts made of brass, steel, iron, bronze, copper and aluminum. With the equipment it is obvious that many repairs formerly requiring considerable time with old methods can be made quickly.

The process of welding is well known. The principle of the method is the use of a small concentrated flame of a temperature approximating 3600 degrees Fahrenheit, applied directly to the metals to be welded.

The Cox dual equipment comprises a highly polished oak case, nickel trimmed, with cover and handle as shown in the accompanying illustration. The case contains a welding torch with six interchangeable tips, sufficient to perform welding on all kinds of work; one oxygen reducing and regulating valve, with gauge and shut-off; one acetylene reducing valve, with gauge and shut-off, fitted with special coupling for attaching to Prest-O-Lite gas tank; 12 feet of acetylene hose, 12 feet of oxygen hose and a complete assortment of welding rods for welding copper, brass, iron, bronze, steel and aluminum. The wrenches, goggles, etc., are packed in a special, convenient case.

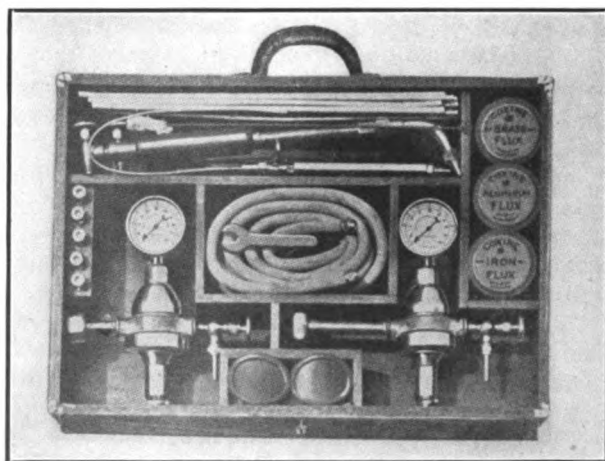
In addition there is included a decarbonizing torch and swab for removing carbon from motor cylinders by the oxygen process. The last named provides the dual equipment to which reference is made above.

The Cox Brass Manufacturing Company calls especial attention to the low cost of the apparatus, which is marketed as a unit or separately. A special gauge for showing the supply of oxygen on hand is listed at a slight extra cost. The company supplies complete instructions for the use of both systems, and maintains a free service department for the benefit of its customers. One of the features of the department is the expert information supplied for repairs out of the ordinary.

The company calls especial attention to the regulator or reducing valves, stating that they are so constructed as to automatically reduce the pressure of the oxygen from that of the tank of 1800 pounds, and that of the acetylene tank from a pressure of 200 pounds, to a low, workable pressure of from zero to 25 pounds. The pressure is regulated to an even consistency and does not vary from a set amount. Complete details and price lists will be forwarded upon application to the company.

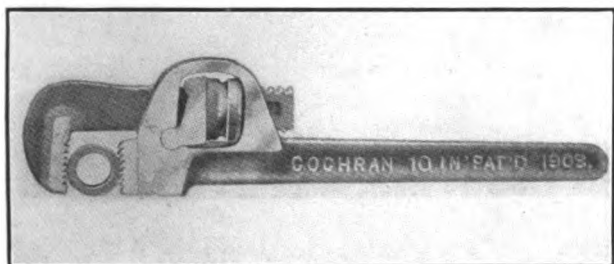
COCHRAN PIPE WRENCH.

The Cochran Pipe Wrench Manufacturing Company, 78th street and Woodlawn avenue, Chicago, is marketing the Cochran pipe wrench shown in an accompanying illustration. It is warranted to give 50 per cent. more service than



Case Containing Tips, Valves, Etc., Utilized with Cox Combination Welding and Decarbonizing Outfit.

conventional designs, and the guarantee is very liberal. One of the qualities of the tool emphasized is that the compression strain is exerted on



Cochran Pipe Wrench Having a Solid Frame and Movable Hook Jaw.

that part of the member which is the strongest.

The frame and handle are one solid piece, and a rocker replaces the usual pin, eliminating opportunity of shearing stresses. The jaw is of the hook type and is with the inserted jaw, drop forged from the best grade of tool steel. The rocker and adjusting nut are also constructed of high grade material.

The maker claims a perfect grip and release by its construction, and states that the tool cannot be injured by a side pull, owing to its solid frame construction. It is guaranteed not to crush or lock on pipe. The Cochran wrench is made in six, eight, 10, 14, 18, 24 and 36-inch sizes, taking from .125-inch wire to 1.5-inch pipe for the smallest size, and upwards for the larger wrenches. All parts are standard and interchangeable.

COMMON SENSE BORING TOOL.

W. W. Blakely, 100 Leicester Court, Detroit, is manufacturing the Common Sense boring tool, made in two parts, and designed for service on milling machines, lathes, etc. The shank and barrel are integral, and the dial and holder are combined. The tang of the tool does all of the driving and calibration is by the vernier system reading in thousandths. Throwing the two eccentrics opposite each other centres the bar, and changing the inner eccentrics' position enlarges the cut, giving a total expansion of .5 inch or more. It is made with .625, .75 and .875-inch boring bars. A toolmaker's size is also made. Prices and particulars will be forwarded by the maker on request.

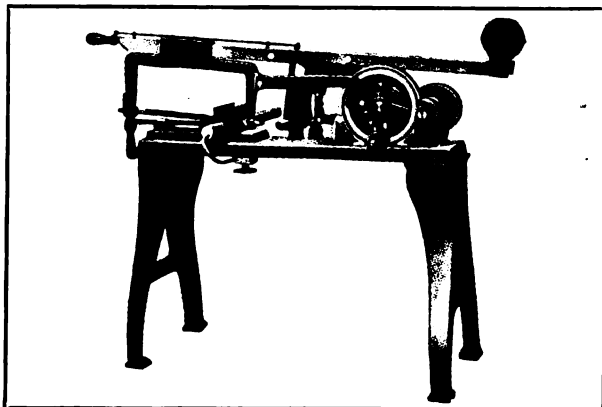
UNIVERSAL HACKSAW MACHINE.

Power hacksaws are time savers in the repair shop and service station, as not only is consid-

erable time wasted in cutting metal by the hand tool, but with large pieces it is not always easy to make an accurate cut. The West Haven Manufacturing Company, West Haven, Conn., produces a line of hacksaw frames and blades, and is marketing the Universal hacksaw machine shown in an accompanying illustration. It has a capacity of six-inch solids, and one of the qualities of the equipment is the quick return of the stroke, this being 3:1. The blade also lifts entirely from the work on the return stroke.

The machine is designed especially for economy and speed. There are two fixed strokes, a five and a seven-inch, and only one adjustment is required; that is, for work above five inches in diameter or square. The maker states that the adjustment may be made in the short time of 15 seconds. Another feature of the machine is that the automatic lift is adjustable for wear. It is stated that the automatic stop is absolute, and that the pulley can be lubricated without throwing off the belt. The company calls special attention to the shafts of the machine, stating that these are silent, and being on the bed of the machine make for maximum service. All parts are interchangeable.

The size of the pulley employed is six by 1.75 inches and the speed is 240 revolutions a minute. The length of the saw blades is 12 and 14 inches. The floor space required is 52 by 16 inches; height of work vise, 28 inches, and height over all, 42 inches. The net weight is 240 pounds; gross, 300. All castings are numbered, making for convenience when ordering spare parts. The company issues a catalogue of its products, which will be mailed free on request. The West Haven Manufacturing Company makes a specialty of hacksaws, producing them to meet all requirements, such as cutting solid metals, tubing, etc.

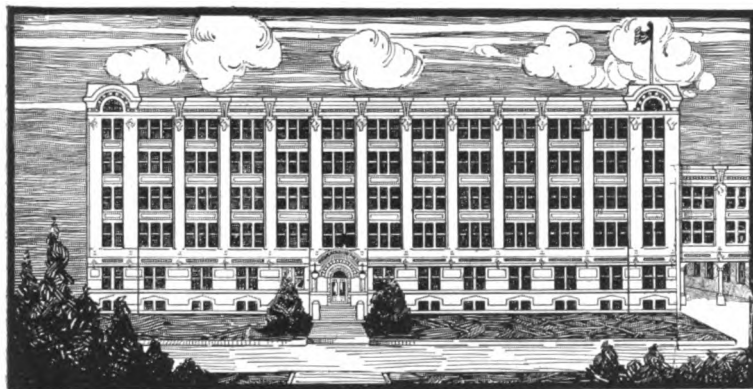


Universal Power Hacksaw Machine Having Rapid Return of Stroke and Being Capable of Cutting Solids up to Six Inches in Diameter.

NEW DEPARTURE'S OFFICE BUILDING.

SOMETHING like 25 years ago, the New Departure Manufacturing Company, Bristol, Conn., maker of New Departure ball bearings, etc., started business in a small room containing less than 60 square feet. Today, it is occupying nearly that many square acres, with several millions of dollars invested in machinery, operated by 2000 skilled mechanics, busy day and night a greater part of the time. It has one of the most thoroughly equipped manufacturing plants in America. One entire building is devoted exclusively to the scientific study and analysis of steel and manufacturing processes, this structure housing chemical, metallurgical and physical testing laboratories, outfitted with the most modern apparatus.

The remarkable growth of this concern dur-



New Administration Building of the New Departure Manufacturing Company, Bristol, Conn.

ing the past few years has frequently made it necessary to provide large additions to its manufacturing facilities. A little more than a year ago the demand for New Departure ball bearings had increased so rapidly that it was impossible to await the erection of a new building, and the extensive plant of the Whitlock Coil Pipe Company, in Hartford, comprising 145,000 square feet of floor space, was purchased outright. This proved to be sufficient only for the time being, and it was decided to provide a new administration building, which has been in course of erection during the past twelve months, and is soon to be occupied by the company.

An accompanying illustration presents an exterior view of the structure, which is 62 feet wide, 220 long and six stories high, including the basement. The outer walls are of light gray tapestry brick, in three shades, relieved by broad ribbons of blue and green colored tiles in panel effect at

the second and fifth stories. The front entrance is approached by a broad flight of granite steps, and over it is a large copper marquise in verde antique. On either side of the entrance are large hand carved limestone panels.

The main vestibule has a quoin ceiling decorated in Roman gold. The side walls are panelled in marble. Verde antique is used with centres of Bresch opal. The floor also is of marble and tile, worked in geometrical design with the monogram of the company in green and white as the centre piece. The main lobby, just beyond, is 16 feet square, and has a floor of Italian marble with a border in the predominating verde antique. The wainscot is eight feet high and is worked in Bresch opal and scagliola, with ornamental capitals. The wall surfaces are ornamented with pilasters of Royal Irish scagliola. The ceiling is in simple design of pleasing colors, toning up the marble work. A dome in the centre permits the placing of the electric lamps in such manner as greatly to diffuse the light. At the corners are four smaller domes, with lamps similarly positioned.

The offices are located on the fifth floor, an electric elevator running thereto. At the front and south side are located the private offices of the officials and heads of departments. These are finished with panels of mahogany carried up to the window sills. The partitions in the general office are of plate glass above the wainscot.

The floor is tile and the ceilings have a simple Greek cornice worked in ornamental plaster in delicate shades of cream and apple green, which soften and intensify the light.

At the west side is a double fire and burglar proof vault of two stories. All equipment in this vault is of steel. The entrance is guarded by modern fire and burglar proof steel doors. Another feature of the main office is the large leaded glass dome ceiling light, 112 feet long and 16 feet wide, supported on pilaster columns of the Doric order. The colors in the dome are opalescent greens and ambers, which catch and diffuse the sun's rays without causing shadows.

On this floor, in addition to the general and private offices, is a large foreman's conference room with a small kitchen attached, equipped for serving lunches, etc. All office furnishings are of mahogany and the workers in each department are immediately opposite the head of that depart-

ment. The remainder of the building will be occupied principally by the inspection and assembling of the company's product. The first floor will be given over entirely to shipping and receiving.

Beginning Jan. 1, changes were effected in the organization, which are expected still further to develop the plant to its many possibilities. Albert F. Rockwell, who was one of the founders of the company and whose genius has developed the patents covering the company's product, has been relieved of certain managerial detail, but continues his duties as president.

Dewitt Page, who has been identified with the concern almost from its inception, and in later years as secretary, sales manager, purchasing agent and advertising manager, has been appointed general manager. Mr. Page is well known to the trade and brings to this position unusual ability, and a knowledge of the company's affairs in production and promotion that specially qualifies him for the duties.

Charles T. Treadway, who for some years has been treasurer of the company, continues in that capacity, and also becomes chairman of the board of directors, a position which makes him an important factor in the future development of one of the most successful New England enterprises.

SECURES LARGE ORDER.

Driggs-Seabury Ordnance Company to Build Them for Twombly Concern.

According to a special dispatch from Pittsburgh, Penn., the Driggs-Seabury Ordnance Corporation of Sharon, Penn., has been awarded a contract for the manufacture of 3000 automobiles for the Twombly Automobile Company of New York City.

It may be added in this connection that the Twombly Car Corporation, which has offices in New York City and produces the Twombly cyclecar (or light car, whichever it may be under the terms of the new definition), has a plant at Avondale, N. J., about 10 miles outside the Metropolis, where it is stated that the company has ample facilities for manufacturing these machines in large quantities.

Charles E. Wade, of the Chas. E. Wade Sales Company, Detroit, has been appointed sole selling agent for Barthel & Daly, New York City, importer of Schafer ball bearings, in the Middle West. He was with Rhineland Machine Works.

FORD'S CYCLECAR "JOKE".

Also Some Further Information Concerning the Ford Electric Car.

It has been no secret that Henry Ford of the Ford Motor Company, Detroit, has been keeping close watch of the cyclecar movement, and to some it has been made known that experiments had been carried on sufficiently to permit of certain manufacturing plans should occasion seem to warrant such action. As long ago as last November, it was stated by a man who had just returned from the Ford factory that a car of the cyclecar type had been produced by this concern, although there was no disposition to suggest at that time that Ford was preparing to enter the cyclecar field.

During the recent Detroit automobile show, which was held in the new Ford assembly building, a miniature Ford car, fitted with a four-cylinder motor, with bore and stroke of approximately three and four inches, respectively, was wheeled across a portion of the main floor under circumstances evidently intended to create the impression of concealment, although, in reality, everybody in the hall could readily observe what was going on. In this connection, it may be added that the Ford Motor Company has issued an absolute denial that it intends to build a cyclecar.

Apropos of the recent rumor that Henry Ford and Thomas A. Edison were working on a new electric car of light weight and low price, it is stated in Detroit, that Edsel Ford, vice president of the Ford Motor Company and son of Henry Ford, is to head the new company which will be organized for the production of this machine. Additional information suggests that the car will be made in Detroit, some time during the present year, and that it will sell for about \$600.

The Anderson Electric Car Company, Detroit, maker of the Detroit electric line of pleasure cars and trucks, reports that it has been working overtime for the past two months and that the orders for December were 20 per cent. in advance of the same month in 1912.

The Metropol Motors Corporation, New York City, which recently brought out a new four-cylinder car of large horsepower, is said to be interested in securing a factory site, and is addressing letters for this purpose to several boards of trade and similar organizations.

NEWS OF THE MANUFACTURER AND DEALER.

The following concerns have been incorporated recently to manufacture or deal in motor vehicles, accessories, etc.:

Bay City Auto & Sales Company, Bay City, Tex.; \$7500.
Kerosene Karburettor Kompany, Aberdeen, S. D.; \$500,000; W. B. McLaughlin, J. S. Tilney, George J. Hinds, Edward M. Skinner, H. G. Fuller.
Knuckey-Mysing Auto Company, New Orleans, La.; \$10,000; W. A. Knuckey, W. F. Mysing and others.
Motor Gasoline Company, Muskogee, Okla.; \$25,000; J. M. Givens, E. C. D. D'Yarmett, W. E. D'Yarmett.
Fort Wayne Supply Company, Fort Wayne, Ind.; \$50,000; Jeremiah M. Cramer, John A. Brewer, Harry H. Criswell.
Wentworth, Fosdick Company, Boston, Mass.; Frank Wentworth, Harry Fosdick, Edwin J. Carruthers.
Utah-Idaho Auto Company, Logan, Utah; \$25,000; Morgan Knapp, J. P. Griffin, Wilford O. Johnson, John Everton, W. H. Stewart.
Steel King Motor Car Company, Lansing, Mich.; \$100,000; E. S. George, S. T. Craple.
Somerset County Automobile Association, Somerville, N. J.; F. G. Thomas, Dr. George Voorhees, Dr. Ely, Dr. Naylor, John Case.
Morgan Auto Company, Sioux City, Ia.; \$50,000.
Durand Auto Company, Durand, Mich.; E. Henry, A. E. Van Slyke.
Cycle Manufacturing Company, Chicago, Ill.; \$15,000; George A. Chilton, D. C. Thorsen, Phillip Lawrence.
Bergman Bros., New York City; \$2000; H. Weinstein, M. Bergman, T. Bergman.
Columbian Auto & Motor Car Company, Port Richmond, N. Y.; \$5000; J. A. Wisely, F. F. Leman, E. T. Shortt.
McGraw Tire & Rubber Company, New York City; \$1000; R. F. Hobron, W. L. Levy, M. Davidson.
Ajax Auto Service, New York City; \$5000; A. G. McKeever, J. J. Bradley, J. P. Shinnick.
Trenton Motor Car Company, St. Louis, Mo.; \$10,000; J. L. Nugent, A. F. Becker and others.
United Auto Supply Company, Waco, Tex.; \$5000; R. S. Keyser, S. Zeve, S. W. Wexler.
Henderson Gasoline Company, Nowata, Okla.; \$200,000; W. O. Strother, J. Wood Glass, F. P. Peterson.
Automobile Club of San Antonio, San Antonio, Tex.; \$8000; W. A. Herring, Emil Frank, H. G. Staacke, Dr. Frederick Fielding, John B. Carrington.
Bond Auto Company, St. Louis, Mo.; \$10,000; H. M. Bond, C. Kist, C. Bond.
Automobile Funding Company of Seattle, Seattle, Wash.; \$500,000; F. W. Clay, C. A. Bradley.
Seattle Motor Speedway Corporation, Seattle, Wash.; \$200,000; J. C. Hayward, Harry W. Doherty, A. B. Simmernacher, Howard S. Amon, R. G. Dennev.
Rex Oil & Refining Company, Oklahoma City, Okla.; \$50,000; L. M. Pierucci, M. Luty, N. Boyce.
Horn Auto Supply Co., Omaha, Neb.; \$25,000; to deal in automobiles and accessories; Charles E. Fanning, F. J. McShane, Jr., William H. Horn.
Renton Auto Tire Company, Renton, Wash.; \$4000; Hugh B. Campbell, James L. Morfoot, Jesse F. Spurgeon, Joe Wood.
Sullivan Automobile Company, South Charleston, O.; \$5000; F. J. Sullivan and others.
Motor Service Company, Washington, D. C.; \$15,000; Thomas J. Raumstine and others.
Davis-Sparger Auto Company, Nashville, Tenn.; \$5000; Daniel Murray, Marlon M. Clish, George L. Grant.
Waterhouse-Sands Motor Company, Seattle, Wash.; \$100,000; Frank Waterhouse, P. E. Sands, Joseph Waterhouse.

GARAGE AND DEALER.

James Bennett, Rippey, Ia., has bought the business of the Graham Auto Company.
George H. Wike and **Edward Keller**, Barry, Ill., have entered the trade there. They will handle Maxwell cars.
Edward Coffey, Plattsburg, N. Y., has opened a new auto supply and repair shop at 67 Clinton street.
S. W. Wexler, general manager of the United Auto

Supply Company, New Orleans, La., will open an accessory store in Tucson, Ariz.

The Tyler Automobile Company, Pueblo, Col., agent for the Overland cars, has opened headquarters with the Owens Automobile Company at Sixth and Court streets.

Alexander C. Sutherland, Goshen, N. Y., formerly deputy county clerk, has entered the automobile business in that city.

The Jawer's Auto Supply Company, Philadelphia, has opened an agency for tires, accessories and supplies.

The Brunn Carriage Manufacturing Company, Buffalo, N. Y., distributor for the Peerless and Hupmobile cars, has also taken the agency for the A. V. shock absorber.

L. C. Lessenich, Sioux City, Ia., owner of the Pioneer Automobile Company, has sold his stock to S. C. Brown.

George J. Bohan, Sacramento, Cal., representing Cuyler Lee of San Francisco, has opened headquarters at 3308 K street.

Mankin & Connell, Philadelphia, Penn., has opened a magneto service station at 1416 Vine street.

A. H. McGraw, Syracuse, N. Y., who has handled bicycles and motorcycles for over 22 years in that city, has taken on automobiles. He has secured the Metz agency and will continue at his former location on West Jefferson street.

A. Hanton Chace, Los Angeles, Cal., has taken the agency for the Acme Torsion springs at 1044 South Olive street.

William Faatz, Oswego, N. Y., owner of the Binghamton garage, has leased a building on North avenue and will open a salesroom for automobiles.

Allen & Hardy, Monticello, Ark., has opened an automobile supply store.

Haley & Sheraton, Everett, Wash., distributor for the Ford cars, will purchase the business of the Ferrell Auto Company. The concern will also handle the Buick and Cadillac cars.

The Hartford Automobile Exchange, Hartford, Conn., will deal in second hand cars. The company is located in the Hartford National Bank building.

The M. & M. Sales Company, Reading, Penn., has taken the agency for the Prowodnik tires.

Bradley J. Saunders, Birmingham, Ala., formerly interested in the East Lake Land Company, has entered the automobile business, having taken over the agency for the Hudson cars. A company has been formed by him to be known as the Saunders Motor Car Company, and will be located at 422 South 20th street.

The Oregon Garage & Supply Company, Greenwood, S. D., has opened for business in the old quarters of the Greenwood garage on Maxwell avenue. O. M. Dantzler is president of the company and A. H. Jennings is manager. The company has the agency for Buick and Chevrolet cars.

The Western Motor Supply Company, Milwaukee, Wis., is the name of a new automobile firm located at 408 Jefferson street. The company will handle all lines of automobile, motorcycle and cyclecar supplies, and act as a jobber of automobile equipment as well.

The Bacon Wain Motor Sales Company, Toledo, O., has established salesrooms in a building at 1017 Jefferson avenue. The company is agent for the King, Empire and Pullman cars. It will also retain a repair shop at 840 Dorr street.

The Fisher Automobile Company, Indianapolis, Ind., has taken the agency for Hess-Bright ball bearings and will also handle all of the renewal business.

The Delancy-Cope Tire & Rubber Company, Kansas City, Mo., is the name of a new tire firm located there, and quarters have been obtained at 407 East 15th street. The firm will be the local distributor for the Motz, Portage and Polack tires.

Newell & Eccles, St. Louis, Mo., has opened offices and salesrooms at 3104 Locust street, where it will do business as agent of the Empire gasoline economizer.

The Goodby-Rankin Company, Providence, R. I., announces that it has obtained the services of William G. Rankin, who formerly had charge of the automobile supplies department for Belcher & Loomis of that city.

The Jeffery Auto Sales Company, San Francisco, Cal., announces that its new display rooms at the service building, 56-72 12th street, are now in first class condition. The entire line of cars is shown here, and to much better advantage.

WITH THE MANUFACTURERS.

The Detroit Steering & Windshield Company, Detroit, has changed its name to the Metalwood Manufacturing Company.

The Crown Motor Car Company, Louisville, Ky., manufacturer of the Crown cars, is planning to remove to Hamilton, O.

T. A. Hoover and E. G. Parsons, Fresno, Cal., have formed a partnership and the company will be known as the Hoover-Parsons Spring Company, to manufacture springs for automobiles.

The Pacific Kissel-Kar Branch at San Francisco, Cal., held an automobile show recently. The occasion was the opening of the company's new service building, the largest on the Coast.

The Paige-Detroit Motor Car Company, Detroit, maker of Paige cars, has opened its new factory. The main building is 816 feet long and 60 feet wide, three stories in height, and there is a wing of 120x60 feet. One of the unique features of this new equipment is that occupancy is had without one dollar to be paid out of the profits of the cars built in the future.

The Portage Rubber Company, Barberton, O., has decided to build an addition to its plant at a cost of \$25,000.

The White Company, Cleveland, O., maker of White pleasure cars and trucks, was recently the "victim" of a pleasant surprise party, when 84 merchants, bankers, lawyers, farmers and men in other walks of life from

has leased three buildings in Newark, N. J., which, when equipped, will be utilized for the manufacture of storage batteries. The buildings acquired were a part of those which at one time were occupied by the Titan Steel Works. Henry Keith of New York is president of the company.

The H. Lund Smith Company, Paterson, N. J., manufacturer of windshields, tops and other equipment, has purchased the plant of the Paterson Manufacturing Company of that city. The latter concern manufactures leather and fabric novelties, and the acquirement of the plant will permit the H. Lund Smith Company to produce slip covers, hood and tire covers and similar specialties.

The Electric Auto-Lite Company, Toledo, O., engaged in the manufacture of electric starting and lighting devices, has increased its capital stock from \$100,000 to \$225,000.

The U. S. Ball Bearing Company, Oak Park, Ill., announces that since Jan. 1 the product of the company is being marketed by its own sales force, with headquarters at the home office in Oak Park. The company had been represented by Denton & Flagg.

The Lyons-Atlas Company, Indianapolis, Ind., has issued the Lyons-Atlas News, which will be published as a regular house organ by the company. It is well edited and contains a number of articles of interest to dealers and owners of Lyons-King cars.

The Presto Inter-Rim Company, Boston, Mass., has made arrangements with the Cleveland Welding & Man-



Delegation of Iowa Men Which Recently Tendered the Officials of the White Company, Cleveland, O., a Novel Surprise Party.

Des Moines and Oskaloosa, Ia., in charge of O. F. Shee, Central Iowa distributor for White products, arrived at the factory in two special railway cars. The officials of the company soon recovered from the surprise sufficiently to escort the party about the plant, show them everything there was to see, and get them to pose for a picture, which last named is reproduced herewith. In addition, they were entertained by a tour of the city in White omnibuses, and by a luncheon at the Cleveland Athletic Club.

The Hyatt Roller Bearing Company, Newark, Detroit and Chicago, is distributing a handsome folder, containing a reproduction of Sun Yat Sen, provincial president of China, and Vice President Drake of the Hupp Motor Car Company, Detroit, in a Hupmobile on the streets of Shanghai, China. Of course, attention is called to the fact that the car in question is fitted with Hyatt roller bearings.

The Maccarr Truck Company, Scranton, Penn., which moved recently from Allentown, where it had been operating since 1904, is having new and up-to-date machinery installed in its new manufacturing plant recently completed.

The McCormick Manufacturing Company, Dayton, O., and the Eastern Machine Screw Corporation, New Haven, Conn., have taken out spark plug licenses under the Canfield patent, held by A. R. Mosler & Co., Mount Vernon, N. Y.

The Titan Storage Battery Company, Baltimore, Md.,

manufacturing Company, Cleveland, to manufacture the Presto rim. The Cleveland company was one of the pioneers in the rim field, and is equipped to build the Presto rims in large quantities. The Presto Inter-Rim Company has also closed with the American Distributing Company, Jackson, Mich., to handle the sale of the rims in the West.

The Timken Roller Bearing Company, Canton, O., has found it necessary to build a large addition to its plant. The new structure is one story high, with a ventilator above its centre for light and ventilation.

The Doehler Die Castings Company, Brooklyn, N. Y., recently made arrangements for a branch factory at Toledo, O., and already has found it expedient to double the capacity first provided for in the plans. Instead of only having 10,000 square feet, the new structure will provide 20,000 square feet, under the general management of H. B. Griffin, vice president of the company.

The Wasatch Motor Manufacturing Company, Salt Lake City, Utah, will erect a factory on State street, for the manufacture of its trucks.

The République Rubber Company, Youngstown, O., maker of the well known Republic Staggard Tread tires, has recently placed upon the market a tire designed especially for the Ford cars.

The Way Muffler Company, Philadelphia, Penn., is considering the establishment of its plant at Wilmington, Del. The company has taken the matter up with the Chamber of Commerce.

RECENT PATENTS.

Starting Mechanism, Edmond Fillettaz, Lyons, France; No. 1,083,929. Filed Aug. 2, 1912.

Electric Spark Producing Apparatus, George W. Wacker, New York City, assignor to J. S. Bretz Company, same city; No. 1,083,964. Filed Aug. 10, 1908.

Pneumatic Suspension, John Williamson, New York City, assignor of one-half to Warren Y. Huff, Brooklyn, N. Y.; No. 1,083,969. Filed March 26, 1912.

Resilient Wheel, Alfred R. Wylie and James G. Wright, Big Spring, Tex.; No. 1,083,976. Filed Nov. 11, 1912.

Taximeter, Walter Lewin, Aberdeen, Wash.; No. 1,084,018. Filed July 31, 1911.

Tire, James McNamee, Amsterdam, N. Y.; No. 1,084,025. Filed Sept. 30, 1909.

Fender, Richard E. Morrow, Broken Arrow, Okla.; No. 1,084,026. Filed Nov. 12, 1912.

Carburetor, Frank S. Pierce, Minneapolis, Kan.; No. 1,084,028. Filed April 22, 1912.

Taximeter, Paul Richert, Pittsburg, Penn., assignor to Pittsburg Taximeter Company, same city; No. 1,084,032. Filed July 22, 1912.

Rim, Herbert K. Wheelock, Akron, O.; No. 1,084,050. Filed May 1, 1913.

Tractor, Clarence L. Best, San Leandro, Cal.; No. 1,084,062. Filed June 25, 1912.

Transmission, Gustavo Guerra, Washington, D. C.; No. 1,084,084. Filed Feb. 7, 1913.

Spring, Christopher L. Jordan, San Francisco, Cal.; No. 1,084,090. Filed May 12, 1913.

Automobile Cap, Abram Plotkin, Brooklyn, N. Y.; No. 1,084,109. Filed Feb. 12, 1913.

Headlight Dimmer, Gilbert G. Rosing and Frederick W. Thomas, Sandusky, O.; No. 1,084,113. Filed Oct. 28, 1912.

Resilient Wheel, Emil G. Glaser, North Dover, O.; No. 1,084,144. Filed Feb. 6, 1913.

Lubricating Device for Springs, George F. Voight, San Francisco, Cal.; No. 1,084,181. Filed Aug. 18, 1913.

Runner Attachment for Motor Vehicles, Charles A. Wiberg, Chicago City, Minn.; No. 1,084,187. Filed Jan. 25, 1913.

Rotary Engine, Ernst Becker and Franz Dinslage, Charlottenburg, Germany, assignors to Siemens & Halske, A. G., Berlin, Germany; No. 1,084,192. Filed July 1, 1912.

Apparatus for Electric Lighting, Max Metz, Coventry, England; No. 1,084,220. Filed Feb. 9, 1912.

Lock for Clutch Lever, George P. Smith, St. Louis, Mo.; No. 1,084,237. Filed July 3, 1913.

Muffler, Louis F. Pelletier, New York City, assignor of one-third to Emil H. Fickinger and one-third to Ernest F. Ciglia, all of the same city; No. 1,084,290. Filed Aug. 21, 1912.

Resilient Wheel, August Saunier, San Francisco, Cal.; No. 1,084,299. Filed Aug. 19, 1912.

Spring Wheel, Daniel T. Timberlake, St. Paul, Mo.; assignor of one-half to Walter E. Hosch, same city; No. 1,084,302. Filed Jan. 2, 1912.

Spring Wheel, Daniel T. Timberlake, St. Louis, Mo.; assignor of one-half to Walter E. Hosch, same city; No. 1,084,303. Filed Sept. 25, 1912.

Gasoline Meter, Winthrop H. Ford, Torrington, Conn.; No. 1,084,325. Filed April 9, 1913.

Shock Absorber, John R. McConnell, Emmett, Idaho; No. 1,084,353. Filed Sept. 30, 1912.

Method of Constructing Tires, Bradford H. Divine, Utica, N. Y.; No. 1,084,409. Filed May 20, 1912.

Valve, Raleigh Eugene Drennon, Atlanta, Ga.; No. 1,084,410. Filed Feb. 21, 1912.

Spring Wheel, Arthur Gage, Long Lane, Mo.; No. 1,084,421. Filed Oct. 29, 1912.

Tire Protector, Frank Holik, Prague, Okla.; No. 1,084,434. Filed June 25, 1912.

Spring Wheel, Albert S. Kinney, Middletown, O.; No. 1,084,448. Filed June 1, 1910.

Motor, Max Richard Matti, Falun, Sweden; No. 1,084,461. Filed April 25, 1912.

Puncture Proof Pneumatic Tire, Faltine Newbauer, Valley City, N. D.; assignor of one-third to Emil Feldman, same place; No. 1,084,470. Filed April 2, 1913.

Dirigible Headlight, Francis M. Nolder, Wastboro, O.; No. 1,084,471. Filed Feb. 19, 1913.

Motor, William Woodward, Chicago, Ill.; No. 1,084,519. Filed Nov. 4, 1912.

Speed Indicator, Horace H. Welch, Chicago, Ill.; as-

signor to Stewart-Warner Speedometer Corporation, same city; No. 1,084,587. Filed Aug. 13, 1910.

Spark Plug, Frederick M. Furber, Beachmont, Mass.; No. 1,084,543. Filed Aug. 22, 1912.

Wheel, Eli T. Forrester, Denver, Col.; No. 1,084,620. Filed Feb. 1, 1913.

Resilient Wheel, Charles J. Mallings, Easthampton, Mass.; No. 1,084,648. Filed Nov. 18, 1912.

Motorcycle Frame, George H. Meiser, Chicago, Ill., assignor to Excelsior Supply Company, same city; No. 1,084,654. Filed April 21, 1908.

Spring Wheel, George H. Schanck, Libertyville, Ill.; No. 1,084,664. Filed April 4, 1913.

Carburetor, William A. Cahill, Syracuse, N. Y.; No. 1,084,693. Filed July 17, 1911.

Lamp Reflector, Jason C. Stearns, Worcester, Mass.; No. 1,084,713. Filed Dec. 23, 1912.

Electrical Connection, Jason C. Stearns, Worcester, Mass.; No. 1,084,714. Filed March 22, 1913.

COMING EVENTS.

February.

Feb. 9-14—Truck show, Buffalo, N. Y.
 Feb. 9-14—Show, Grand Rapids, Mich.
 Feb. 9-14—Show, St. Louis, Mo.
 Feb. 9-14—Show, Portland, Me.
 Feb. 9-14—Show, Louisville, Ky.
 Feb. 11-14—Show, Geneva, N. Y.
 Feb. 14-21—Show, Pittsburg, Penn.
 Feb. 16-21—Canadian national show, Toronto, Ont.
 Feb. 16-21—Show, Kansas City, Mo.
 Feb. 16-22—Show, Memphis, Tenn.
 Feb. 17-20—Show, Sioux Falls, S. D.
 Feb. 17-21—Show, Salt Lake City, Utah.
 Feb. 18-21—Show, Easton, Penn.
 Feb. 18-21—Pleasure car show, Albany, N. Y.
 Feb. 18-21—Show, Bloomington, Ill.
 Feb. 21—Vanderbilt Cup race, Santa Monica, Cal.
 Feb. 21-28—Show, Hartford, Conn.
 Feb. 21-28—Show, Newark, N. J.
 Feb. 21-28—Pleasure car show, Cincinnati, O.
 Feb. 21-28—Show, Elmira, N. Y.
 Feb. 23—Grand Prize race, Santa Monica, Cal.
 Feb. 23-25—Truck show, Albany, N. Y.
 Feb. 23-28—Show, Indianapolis, Ind.
 Feb. 23-28—Show, Omaha, Neb.
 Feb. 24-28—Show, Syracuse, N. Y.

March.

March 2-4—Truck show, Cincinnati, O.
 March 2-6—Show, Fort Dodge, Ia.
 March 2-7—Show, Utica, N. Y.
 March 2-7—Show, Sioux City, Ia.
 March 3-6—Show, Grand Forks, N. D.
 March 4-7—Cortland, N. Y.
 March 4-7—Show, Tiffin, O.
 March 5-7—Show, Elgin, Ill.
 March 7-14—Pleasure car show, Mechanics' building, Boston, Mass.
 March 7-14—Show, Hamilton, Ont.
 March 9-14—Show, Des Moines, Ia.
 March 17-21—Truck show, Mechanics' building, Boston, Mass.
 March 21-28—Show, St. John, N. B.

April.

April 9-15—Show, Manchester, N. H.

May.

May 24-25—Targa Florio race, Italy.
 May 30—500-mile race, Indianapolis, Ind.

June.

June 9-11—Isle of Man road race.

July.

July 3-4—Road races, Tacoma, Wash.
 July 4—300-mile race, Sioux City, Ia.
 July 4—Grand Prix, Lyons, France.
 July 13-14—Track meet, Seattle, Wash.
 July 25-29—Grand Prix race, Belgium.

August.

Aug. 28-29—Road race, Elgin, Ill.

September.

Sept. 9—Road races, Corona, Cal.
 Sept. 9—Grand Prix, Italy.

October.

Oct. 1-10—International show, Berlin.
 Oct. 16-26—Automobile Salon, Paris.

November.

Nov. 6-16—Olympia show, London.

STANDARD CHARGING PLUG.

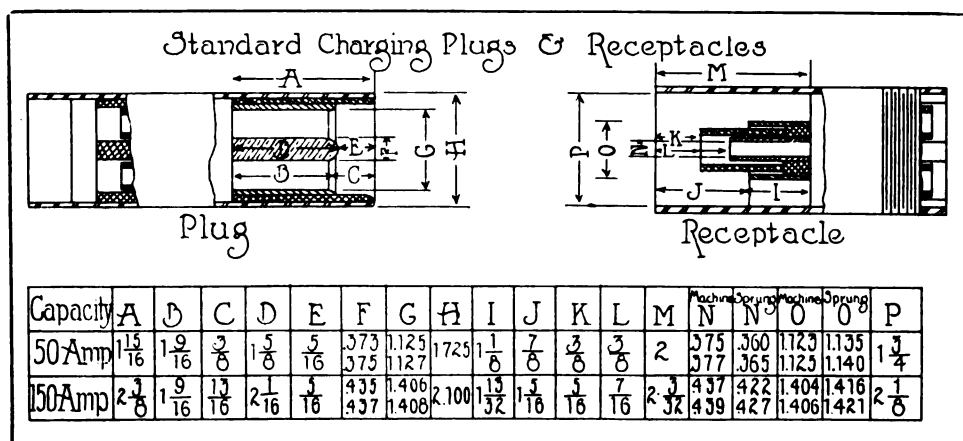
Two Sizes, Outside Contact Positive, Approved by Electric Vehicle Association.

For the benefit of all who may be in any way interested the Electric Vehicle Association of America is distributing a specification sheet showing a detail sketch of the standards for charging plugs recently approved by the organization. Those familiar with electric vehicles understand the value of this information, but for the benefit of those who may not be informed the explanation is made that the charging plug is the terminal of the cable lead from the line carrying the current, and is a permanent fixture. All vehicles are fitted with a receptacle, so-called, which is connected with the wiring of the battery and the operation of charging is practically automatic when the charging plug is fitted into the receptacle. But efficient transmission of energy is only practical where the contacts are good and the charging plug fits the receptacle. Until the present time charging plugs and receptacles have not been uniform. A charging cable and plug is not generally carried, and when in the event of emergency a supplementary charge is necessary if the plugs of the cables will not fit, or fit imperfectly, the receptacles of the vehicle, a situation results that is exasperating, if not serious, and when applied to a service machine may be discouraging.

A standardization committee of the association carefully considered the problem, and in communicating with manufacturers of vehicles found that out of 20 replies 13 were using a concentric type plug. Of this 13 nine made the centre terminal negative, and five manufacturers made the centre terminal positive. In view of the facts ascertained the committee recommended that the association approve a plug with the outside terminal positive and the inside negative.

The specification sheet shows that the committee recommends two standard sizes, the smaller of 50 amperes capacity for pleasure cars, and the larger of 150 amperes capacity for trucks,

either to have a 50 per cent. overload capacity. The detail dimensions are set forth in a tabulation. The National Board of Fire Underwriters has approved plugs of the dimensions given. The association's committee has recommended that the terminals should be large enough to receive cable having a rating, according to the Underwriters' Code Table B, at least equal to the normal rating of the plugs, and that the terminals should be marked plus and minus to correspond to the polarity of the plugs. The committee is now distributing these sheets to all persons interested, to manufacturers, owners and charging stations and garages, urging the prompt adoption of the standardized plugs and receptacles, and the change of polarity, both on old and new vehicles, and charging equipment, to bring about a desired uniformity. The belief is, that when the standard has been adopted and the change made as suggested, electric vehicles can be



The Detail Drawings and Dimensions of the Charging Plugs and Receptacles Approved and the Use Recommended by the Electric Vehicle Association.

charged anywhere that electric current is made, and all delays or complications will be eliminated.

The Adamson Manufacturing Company, East Palestine, O., is calling the attention of the trade to the recent decision of Judge Dyer in the United States district court for the eastern district of Missouri, sitting in St. Louis, in the action brought by this company against the Gilliland Auto Supply Company of St. Louis, alleging infringement of the Adamson patent on vulcanizers. The decision was for a decree and permanent injunction, and the company maintains that this covers vulcanizers constructed to retain a combustible fluid which is heated simultaneously with the vulcanizer by the combustion of the fluid, and the temperature is thereby automatically controlled.

BUICK ECONOMY TESTS.

Four and Six-Cylinder Models Undergo Interesting Trials in Chicago.

With Chicago newspaper men and technical automobile writers as official observers, and F. E. Edwards, formerly chairman of the American Automobile Association's technical committee, as conductor, the Buick Six and B-25, made by the Buick Motor Company, Flint, Mich., were submitted to gasoline consumption tests in Chicago, Jan. 14. The six-cylinder model made 20.1 miles to the gallon and the four-cylinder 22.7.

The conditions of the test required that at no time should the clutch be thrown out. The weather was a mixture of snow, sleet and rain, and the temperature was about 45 degrees Fahrenheit, and at the finish 27 degrees. More than one-third of the distance was covered against the wind, which, according to the government weather bureau, was blowing 23 miles an hour.

Inspector Edwards examined the cars to satisfy himself and the committee that everything was standard, and also made a test of the gasoline to determine that it was of standard grade. After the completion of the runs, the cars were weighed with the passengers, and again inspected by Mr. Edwards. They were then driven to the Stewart-Warner Speedometer Corporation's headquarters, where certificate was given as to the correctness of the speedometer.

SECOND PITTSBURG SHOW.

Seventy Makes of Pleasure and Commercial Vehicles in Exposition Hall.

The first 1914 Pittsburg automobile show having passed into history, it is in order to note that the second display in that city will be held in Exposition hall, Feb. 14-21. Officially, this is designated as the fourth annual automobile and truck show of the Pittsburg Auto Show Association. J. H. Zimmerman is manager.

From the advance announcements, it would appear that in point of number of exhibitors, at least, this second exhibition will be larger than the first. Already 70 makes of pleasure cars and trucks have been entered. In one respect, however, if the statement of the management be accepted, this display will set a new record for America. Twenty different makes of cyclecars are promised.

The decorative treatment will be entirely new, some 10,000 feet of continuous paintings

having been secured with which to drape the walls. The electric equipment will require 300,000 bulbs, which will be festooned about the interior. Additional space will permit of an enlarged accessory department, and every effort will be made to present the biggest and best show western Pennsylvania ever has known.


RAD-FIX RADIATOR COMPOUND.

A Filtered Chemical Solution for Repairing Leaks in the Cooling System.

Rad-Fix is manufactured by the Radiator Fix Company, 121 Massachusetts avenue, Boston, and as the name implies, it is compounded to repair leaky radiators. One of the qualities emphasized in it is that it is a filtered solution and will pass easily through the screen of the radiator. It is a chemical solution and the maker states that its action on lead, copper and brass causes crystallization of the metals on the outside of the radiator, forming a permanent weld.

It is left in the cooling fluid and is held to possess cleansing properties as well as to improve the cooling. Rad-Fix is stated to boil at 260 degrees Fahrenheit, considerably above water, an advantage in service on mild days, and to freeze at 26 degrees, six below that of water. Rad-Fix is sold in gallon cans and is accompanied by a strong guarantee.

Secretary-Treasurer G. B. Gibson of the Federation of American Motorcyclists, reports that 168 new members were secured during the month of January, classified according to states as follows: Illinois, 25; New York, 21; Pennsylvania, 20; Iowa, 14; Ohio, 13; Indiana, 13; New Jersey, seven; Florida, six; Georgia, six; Kansas, six; Arizona, four; Maryland, four; Nebraska, three; Oregon, three; New Hampshire, District of Columbia, Texas, Wisconsin, Michigan and California, two each; Maine, Massachusetts, Rhode Island, North Carolina, Alabama, Oklahoma, Missouri, Minnesota, North Dakota, Washington and the Philippine Islands, one each.



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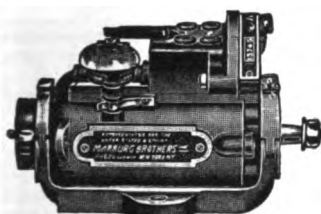
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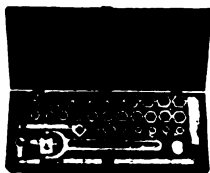
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METZ "Twenty-Two" \$475

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Bay State Autokit, No. 2, \$7.50

Bay State Stickit, \$3

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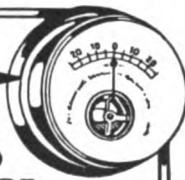
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Metz Company, Waltham, Mass. (Metz.)

Moline Automobile Co., E. Moline, Ill. (Moline.)

National Motor Vehicle Co., 1033 22nd St., Indianapolis. (National.)

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Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)

Premier Motor Mfg. Co., Indianapolis, Ind. (Premier.)

Reo Motor Car Co., Lansing, Mich. (Reo.)

Studebaker Corp., Detroit. (Studebaker.)

Stutz Motor Car Co., Indianapolis. (Stutz.)

(Continued on Next Page.)

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Dart Manufacturing Co., Waterloo, Ia. (Dart.)
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Gramm-Bernstein Co., Lima, O. (B. A. Gramm's.)
Knox Automobile Co., Springfield, Mass. (Knox and Martin Tractor.)
Owen & Co., R. M., 19 W. 62d St., New York City. (Reo.)
Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)
Reo Motor Car Co., Lansing, Mich. (Reo.)
Studebaker Corp., Detroit. (Studebaker.)
Sullivan Motor Car Co., 1707 East Ave., Rochester, N. Y. (Sullivan.)
Willys-Overland Co., Toledo, O. (Overland.)

CARS—ELECTRIC COMMERCIAL.

Anderson Electric Car Co., 458 Clay Ave., Detroit. (Detroit Electric.)
Baker Motor Vehicle Co., Cleveland. (Baker.)
Couple-Gear Freight-Wheel Co., 575 Buchanan St., Grand Rapids, Mich. (Couple-Gear.)
Branches: 30th floor, Singer Bldg., New York; 178 Devonshire St., Boston.
General Motors Truck Co., 26 Cadillac Ave., Pontiac, Mich. (GMC.)
Branches: See Cars—Gasoline Commercial.
General Vehicle Co., Long Island City, N. Y. (G. V.)

CARS—FIRE, POLICE AND MUNICIPAL SERVICE.

Cartercar Co., Pontiac, Mich. (Cartercar.)
Couple-Gear Freight-Wheel Co., 575 Buchanan St., Grand Rapids, Mich. (Couple-Gear.)
Branches: See Cars—Electric Commercial.
Knox Automobile Co., Springfield, Mass. (Knox and Martin Tractor.)
White Co., The, 828 E. 79th St., Cleveland. (White.)
Branches: See Cars—Gasoline Pleasure.
Willys-Overland Co., Toledo, O. (Overland.)

(Continued on Next Page.)

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CAMERON CARS

Mechanically Excellent

A remarkable lot of car value is contained in the 1914 CAMERON. Patented Four-Speed Transmission, Water Cooled, Electric Lighting and Starting. Price, \$1200.

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NEW HAVEN, CONN.

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A big, strong, powerful car, having all those refinements and up-to-date features that make the Cartercar a continual source of pride and satisfaction to the owner.

The Cartercar Gearless Transmission insures the utmost ease in handling with no jerking or jarring clutch and clashing or stripping of gears.

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It Will Carry Extra Bulbs Safer Than the Ones in the Lamps of the Car.

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Its efficiency is proved by scientific facts—not mere claims. Write for Ovington Data D. to *The J. M. Shock Absorber Co.*, 210 S. 17th Street, Philadelphia. Branches in Boston, Hartford, Providence, and all leading cities



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Dorian Demountable Rims.

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YOU CAN SAVE 15 PER CENT

of your insurance premium every year by installing a Pyrene Fire Extinguisher in a convenient and conspicuous place on the dash-board of your automobile. For further particulars address

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Are of the highest quality and the cheapest on mileage. They are built to last. Send for price list and particulars.

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(BUYERS' GUIDE—Continued.)

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Northwestern Chemical Co., Marietta, O. (Se-ment-ol Ra-di-ator.)

CHAINS, TIRE, AND ANTI-SKIDDING DEVICES.

Weed Chain Tire Grip Co., 28 Moore St., New York.

CHAINS—TRANSMISSION OR DRIVING.

Boyd, F. Shirley, 903 Boylston St., Boston. (Baldwin.)

Miller, Chas. E., 97-103 Reade St., New York. (Brampton.)

Branches: See Accessory Manufacturers and Jobbers.

COILS.

Heinze Electric Co., Lowell, Mass.

CYLINDER CLEANING COMPOUND.

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.

Milwaukee Auto Specialty Co., 128 Second St., Milwaukee.

Northwestern Chemical Co., Marietta, O. (Carbonox.)

Prest-O-Life Company, 226 Speedway, Indianapolis. (Prest-O-Carbon Remover.)

Branches: Atlanta, Baltimore, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Indianapolis, Jacksonville, Kansas City, Los Angeles, Milwaukee, Minneapolis, New York, Omaha, Philadelphia, Pittsburgh, Providence, San Francisco, Seattle, St. Louis and St. Paul.

ELECTRIC LIGHTING EQUIPMENT.

Culver-Stearns Mfg. Co., Worcester, Mass.; Detroit.

FIRE EXTINGUISHERS.

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

Northwestern Chemical Co., Marietta, O. (Fire-Fly.)

Pyrene Co. of New England, 176 Federal St., Boston.

FUNNELS.

Dover Stamping & Manufacturing Co., Cambridge, Mass. (Dover.)

GASKETS AND GASKET CUTTERS.

Shawver Co., Springfield, O.

GEARS, STEERING.

Ross Gear & Tool Co., 794 Heath St., Lafayette, Ind.

GUNS, GREASE. (See Pumps, Oil and Grease.)

HORNS.

Dean Electric Co., Elyria, O. (Tuto.)

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

Kent Mfg. Works, Atwater, 4937 Stenton Ave., Wayne Junction, Philadelphia. (Monoplex.)

(Continued on Next Page.)

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(BUYERS' GUIDE—Continued.)

IGNITION EQUIPMENT.

Kent Mfg. Works, Atwater, 4937 Stenton Ave., Wayne Junction, Philadelphia.

INSULATION.

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

JACKS, ETC.

Shawver Co., Springfield, O.

LAMP COVERS.

Hopewell Brothers, Newton, Mass. (Hopewell.)
Branch: 1974 Broadway, New York.

LIGHTING SYSTEMS, ELECTRIC.

Apple Electric Co., Dayton, O. (Apelco.)

Dean Electric Co., Elyria, O. (Dynalux.)

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

Remy Electric Co., Anderson, Ind. (Remy.)

LUBRICANTS.

Alsten & Goulding Co., 36 Foster St., Worcester, Mass. (Alding.)

Borne, Scrymser Co., 80 South St., New York. (Colonial.)
Branches: Boston, Fall River, Philadelphia.

Dixon Crucible Co., Jos., Jersey City, N. J., (Graphite.)

Eagle Oil & Supply Co., 104 Broad St., Boston. (Eagle-line No-Karbon.)

Harris Oil Co., A. W., 326 South Water St., Providence. (Harris.)

Branch: 143 No. Wabash Ave., Chicago.

Haws, Geo. A., 148 Front St., New York. (Panhard.)

Branch: 899 Boylston St., Boston.

Indian Refining Co., 17 Battery Place, New York. (Distributors of Havoline Oil.)

Branches: Pacific Coast—Kohl Bldg., San Francisco;

Western—People's Gas Building, Chicago; Southern—

Title Guarantee & Trust Bldg., Birmingham, Ala.; First

National Bank Bldg., Cincinnati, O.; Lynchburg, Va.;

St. Paul.

Invader Oil Co., 80 Broad St., New York. (Invader.)

Branches: 284 Columbus Ave., Boston; 113 Arch St.,

Philadelphia; 512 Kenols Bldg., 11th and G Sts., N. W.,

Washington, D. C.

Miller, Chas. E., 97-103 Reade St., New York. (Pan-American.)

Branches: See Accessory Manufacturers.

New York & New Jersey Lubricant Co., 165 Broadway, New York. (MoToRol, Non-Fluid, Kejex.)

Northwestern Chemical Co., Marietta, O. (Gear-Silence.)

Standard Oil Co., New York. (Polarine.)

Branches: In all cities.

Texas Company, The, 7 West St., New York.

Branches: Boston, Philadelphia, Chicago, St. Louis,

Norfolk, Atlanta, New Orleans, Dallas, El Paso, Pueblo,

Tulsa, Houston.

Vacuum Oil Co., Rochester, N. Y. (Mobiloil.)

Branches: 49 Federal St., Boston; 29 Broadway, New

York; Fourth and Chestnut Sts., Philadelphia; 154 Ex-

change St., Bangor, Me.; 406 Hitchcock Bldg., Spring-

field, Mass.; 117 Commercial St., Portland, Me.; Fisher

Bldg., Chicago; Ford Bldg., Detroit; Indiana Pythian

Bldg., Indianapolis.

Valvoline Oil Co., 27 State St., Boston. (Valvoline.)

MAGNETOS AND SUPPLIES.

Bosch Magneto Co., 223-225 W. 46th St., New York.

(Continued on Next Page.)

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SAGER EQUALIZERS

The Shock Absorbers Which Save Your Car and Tires.
Nothing to Wear, Adjust or Require Attention.
They Take The "Sting" Out of Rough Roads.
Try Them At Our Expense For 30 Days.

Seven Years Of Success.

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Maxwell
Autocar
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THOUSANDS OF DOLLARS

Saved Annually by Use of Sager Bumpers.

Don't Wait for a "Smash-up" to Buy Protection.

DO IT NOW.

PRICES \$6.00 to \$27.50.

Liberal Discounts.
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Used Almost Exclusively On High Grade Cars.
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Ignition and
Generating Apparatus
LOWELL, MASS.

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DETROIT, MICH.



The Lincoln Highway Does not pass through my town

Why should I worry about the Lincoln Highway? I'd have to drive about 300 miles to get to it, and such a thing as devoting the time and money for a long tour is beyond me.

A Question:

Why should I contribute my little mite to this great Ten Million Dollar enterprise? I am not a sport. I am just an ordinary individual, clothing and feeding a moderate family and educating my children. By plugging hard six days in the week I am able to keep out of debt and keep money enough in the bank to buy a new tire occasionally. About the only diversion I have is romping with the kids and piling them and the good wife into the back of the machine and hiking out for a short ride in the country in the late afternoon. Dad is fortunate enough to own an old car and able to buy gasoline enough to keep it going.

The Answer:

Just the same, I am mighty glad if the little \$5 I can pinch out of my earnings will help make it a success. I expect to live several years yet, and I never expect to be without a motor car. I have been dreaming of the time when all our roads will be good, when I can drive 20 miles into the country without accumulating a bunch of expense for repairs. In a word, I want good roads and I want them so badly I can taste the desire. I know that when the Lincoln Highway is put through it will not be five years until every road of consequence in this broad land is a good road. It will spread a whole network of good roads. I will be personally benefited just as if it passed my door.

An Argument

Do you want cheaper hauling of farm products? Do you want a lower cost of vegetables, meats, everything that goes on your table? Do you want a more prosperous land to live in? If you want any of these things you want good roads, and in all the agitation for good roads there has been no movement that carries with it so much of promise for the immediate future as this Lincoln Highway.

Send your contribution to this patriotic cause TODAY to

THE LINCOLN HIGHWAY ASSOCIATION
Detroit, Michigan

Space contributed by THE AUTOMOBILE JOURNAL

Copy contributed by Russel M. Seeds, Seeds Advertising Agency, Indianapolis.

(BUYERS' GUIDE—Continued.)

Branches: 119-121 E. 24th St., Chicago; 1250 Woodward Ave., Detroit; 357 Van Ness Ave., San Francisco.
Eisemann Magneto Co., 225-227 W. 57th St., New York City. (Eisemann.)

Branches: 514 No. Capitol Ave., Indianapolis; 802 Woodward Ave., Detroit.

Heinze Electric Co., Lowell, Mass. (Heco.)

Marburg Bros., 1790 Broadway, New York. (Mea.)

Remy Electric Co., Anderson, Ind. (Remy.)

Splittdorf Electrical Co., 98 Warren St., Newark, N. J.

Branches: 10-20 W. 63rd St., New York; 1110 S. Michigan Ave., Chicago; 180-182 Massachusetts Ave., Boston; 1028 Geary St., San Francisco; 972 Woodward Ave., Detroit; 1228 S. Olive St., Los Angeles, Cal.; S. W. Corner Cherry and Juniper Sts., Philadelphia; 1823 Grand Ave., Kansas City; 1628 Broadway, Seattle. Wash.; London, Eng.; Buenos Aires.

MAILING LISTS.

Owners' Auto List Co., Albany, N. Y.

MASTER VIBRATORS.

New York Cell Co., 338 Pearl St., New York City.

MEASURES.

Dover Stamping & Manufacturing Co., Cambridge, Mass. (Auto and Savol.)

METERS, ETC.

Kent Mfg. Works, Atwater, 4937 Stenton Ave., Wayne Junction, Philadelphia. (Kent Pocket.)

Northwestern Chemical Co., Marietta, O. (Hydrometers and Thermometers.)

MOTORCYCLES AND SUPPLIES.

Miami Cycle & Manufacturing Co., 320 Hanover St., Middletown, O. (Flying Merkel.)

MOTOR STARTERS.

Apple Electric Co., Dayton, O. (Apelco.)

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.

Remy Electric Co., Anderson, Ind. (Remy.)

PACKING, FIRE.

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

PAINT, ANTI-RUST.

Northwestern Chemical Co., Marietta, O. (Never-Rust.)

POLISH.

International Metal Polish Co., Quill St. and Belt R. R., Indianapolis, Ind. (Blue Ribbon.)

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

Northwestern Chemical Co., Marietta, O.

PUBLICATIONS, AUTOMOBILE.

The Automobile Journal, 24 issues, \$1.00 the year.

The Motor Truck (Commercial Car), Monthly, \$2.00 the year.

The Accessory and Garage Journal, Monthly, \$2.00 the year.

(Continued on Next Page.)

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(BUYERS' GUIDE—Continued.)

Motor Truck Construction, Operation, Care and Repair	\$1.00
The A B C of Aerial Navigation	\$1.00
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Lighting the Motor Car by Electricity50
The A B C of Internal Combustion Engine Maintenance and Repair35
The A B C of Carburetor Construction, Maintenance and Repair .....	.35
The A B C of Magneto Systems .....	.35
The A B C of Battery Ignition Systems .....	.35
The Motorcycle, Maintenance, Repair and Construction .....	.35
The A B C of Motor Car Chassis Maintenance and Repair .....	.25
Maintenance and Repair of Motor Car Tires .....	.25
Sent Postpaid to any address in United States upon receipt of price. Address all communications to The Automobile Journal, Pawtucket, R. I.	

PULLERS, WHEEL AND GEAR.

Crane Puller Co., Arlington, Mass.

PUMPS, OIL AND GREASE.

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.

PUMPS, TIRE.

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.
Shawver Co., Springfield, O.

REAMERS.

Martell Motor Co., 1928 Columbus Ave., Boston. (Martell Aligning.)

RIMS—REMOVABLE AND DETACHABLE.

Boyd, F. Shirley, 903 Boylston St., Boston. (Dorian.)
United States Tire Co., Broadway and 58th St., New York.
(Continental and Whittlesey Demountable.)
Branches: New York, Chicago, San Francisco.

ROAD BUILDING MATERIALS.

Barrett Manufacturing Co., New York. (Tarvia.)
Branches: Chicago, Philadelphia, Boston, St. Louis, Cleveland, Pittsburg, Cincinnati, Kansas City, Minneapolis, New Orleans, Birmingham, Ala.; Seattle, London, Eng.; Montreal, Toronto, Winnipeg, Vancouver, Can.; St. John, N. B.; Halifax, N. S.

SELF-STARTERS. (See Motor Starters.)**SHIELDS, MOTOR.**

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City. (Asbestos.)

SHOCK ABSORBERS AND SUPPLEMENTARY SPRINGS.

Boyd, F. Shirley, 903 Boylston St., Boston.
(Continued on Next Page.)

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Cut out the Oil Lamp Nuisance

Get rid of the bad-smelling, old-fashioned oil lamps. Every time you want to light your oil lamps you have to get out of your car.

You can light all lamps right from the seat when your car is equipped with

JM MOBILITE ELECTRIC LAMPS

These lamps operate on dry batteries, and cost about one-third as much to install and only one-third as much to operate as standard electrical equipment. Will burn from 300 to 420 hours on six 30 amp. J-M Dry Batteries. Used for head lights, dash lights, tail lights, speedometer lights and interior car illumination.

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Write nearest Branch for Booklet

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ARE ALL LUBRICATION

Made of the finest Pennsylvania Premium Crude—test free from impurities—there is no waste to HARRIS OILS. "A Little Goes A Long Way And Every Drop Counts."

That is why HARRIS OIL Dealers hold satisfied customers.

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HARRIS MOTOR CAR SOAP:—an efficient soap which will not harm the finest surface.

HARRIS SUPERHEATED STEAM CYLINDER OIL:—Expressly prepared for Steam Driven Motor Cars.



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will dissolve in the water and stop that leak
in the radiator or water
jacket

SE-MENT-OL

ASK YOUR DEALER OR WRITE DIRECT
MANUFACTURED ONLY BY
THE NORTHWESTERN CHEMICAL CO. Marietta, O.

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For the Automobile Owner and Manufacturer
who wants SERVICE for his money
ELECTRIC LIGHTING SPECIALTIES Made to Order
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American Made for American Trade
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Western Branch, 1016-17 Ford Bldg., Detroit



MODEL "66" AUSTIN

Six Cylinders—4 1-2x6—\$4000
Austin Hydraulic Spring Controllers
AUSTIN TWO SPEED AXLE
Some desirable territory still open
AUSTIN AUTOMOBILE CO.
Grand Rapids, Mich.

For Perfect Control and Safe, Comfortable Driving use

Weed Anti-Skid Chains

At all Reputable Dealers
Weed Chain Tire Grip Co., New York

PERFECTION SPRING COMPANY



High-Grade
Pleasure Car
and Motor
Truck Springs

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STARTS—LIGHTS—IGNITES

Six Volt System Does It All.
Write for our magneto exchange offer.

REMY ELECTRIC COMPANY, Anderson, Ind.

PAIGE "36"—\$1275 "25"—\$ 950

Leaders of popular-priced cars—thoroughly built, completely
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(BUYERS' GUIDE—Continued.)

J. M. Shock Absorber Co., 210 So. 17th St., Philadelphia.
(J. M.)

Sager Co., J. H., 271 South Ave., Rochester, N. Y. (Pear-
less.)

SOAPS.

Hopewell Bros., Newton, Mass. (Paos.)

Branch: 1974 Broadway, New York.

Northwestern Chemical Co., Marietta, O. (Dermalene.)

SPARK PLUGS AND IGNITERS.

Aitken & Goulding Co., 36 Foster St., Worcester, Mass.
(Alding.)

Bosch Magneto Co., 223-225 W. 46th St., New York.

Branches: See Magnetos and Magneto Supplies.

Heinze Electric Co., Lowell, Mass. (H. E. Co. Priming.)

Johns-Manville Co., H. W., Madison Ave. and 41st St.,
New York City.

Monier, A. R., & Co., P. O. Box M, Mt. Vernon, N. Y. (Split
Fire.)

Splittdorf Electrical Co., 98 Warren St., Newark, N. J.

Branches: See Magnetos and Magneto Supplies.

SPARK PLUG TERMINALS.

Johns-Manville Co., H. W., Madison Ave. and 41st St.,
New York City.

SPEEDOMETERS, RECORDERS, ETC.

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New York City. (Electric.)

Northwestern Chemical Co., Marietta, O. (Hydrometers
and Thermometers.)

Stewart-Warner Speedometer Corp., Chicago. (Auto-
Meter.)

Branches: 116 Edgewood Ave., Atlanta, Ga.; 925 Boyl-
ston St., Boston; 720 Main St., Buffalo; 2420 Michigan
Ave., Chicago; 807 Main St., Cincinnati; 2062 Euclid
Ave., Cleveland; 1518 Broadway, Denver; 370 Wood-
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apolis; 1613 Grand Ave., Kansas City; 748 S. Olive St.,
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Ave., San Francisco; 611 E. Pike St., Seattle, Wash.;
3923 Olive St., St. Louis; 559 Yonge St., Toronto, Can.

SPRINGS FOR AUTOMOBILE SUSPENSION.

Marburg Bros., Inc., 1790 Broadway, New York. (Mar-
burg-Hagen.)

Perfection Spring Co., No. 1 Plant, 2414 Superior Ave., N.
W.; No. 2 Plant, East 65th and Central Ave., Cleveland.

SPROCKETS.

Boyd, F. Shirley, 903 Boylston St., Boston. (Baldwin.)

STEEL, ETC.

Ward's Sons, E. T., 25 Purchase St., Boston, Mass. (Seam-
less.)

(Continued on Next Page.)

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(BUYERS' GUIDE—Continued.)

TAIL LIGHT DETECTORS.

Harding Specialties Co., Inc., 755 Boylston St., Boston.
(Boston.)

TANKS, ACETYLENE GAS.

Prest-O-Lite Company, 226 Speedway, Indianapolis.
(Prest-O-Lite.)

Branches: See Cylinder Cleaning Compound.

TANKS, TIRE INFLATING.

Prest-O-Lite Company, 226 Speedway, Indianapolis.
(Baby Tire Filler, The Emancipator.)

Branches: See Cylinder Cleaning Compound.

TAPE, ASBESTOS.

Johns-Manville Co., H. W., Madison Ave. and 41st St.,
New York City.

THERMOS CASES.

Dever Stamping & Mfg. Co., Cambridge, Mass.

TIRE ACCESSORIES.

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y. (Holders.)
Shawver Co., Springfield, O. (Tools.)

TIRE CASES.

Hopewell Brothers, Newton, Mass. (Hopewell.)
Branch: 1974 Broadway, New York.

TIRE CHAIN GRIPS. (See Chains.)

TIRE PRESERVATIVES AND PROTECTORS.

Northwestern Chemical Co., Marietta, O. (Tire-Lac.)

TIRES—CASINGS AND INNER TUBES.

Braender Rubber & Tire Co., Rutherford, N. J. (Braender.)

Cataract Rubber Co., Wooster, O. (Cataract.)
Branches: Boston, New York, Providence.

Dayton Rubber Mfg. Co., Dayton, O. (Dayton Airless.)

Gaulois Tire Corp., 1926 Broadway, New York. (Gaulois.)

Goodyear Tire & Rubber Co., Madison St., Akron, O. (No-Rim-Cut.)

Branches: In all principal cities.

United States Tire Co., Broadway and 58th St., New York.
(Continental, G & J, Hartford, Morgan & Wright.)

Branches: See Rims—Removable and Detachable.

TIRES—CUSHION.

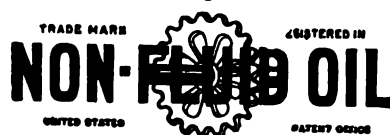
Cataract Rubber Co., Wooster, O. (Cataract.)
Branches: Boston, New York, Providence.

(Continued on Next Page.)

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Safeguard your car
from wear in bearings and
gears—by using



This splendid lubricant interposes a strong, oily film between the metal surfaces which prevents their contact. All the wear comes on the lubricant.

NON-FLUID OIL works equally well in cold weather and hot.

NON-FLUID OIL costs less than other lubricants, per mile or per month.

Packed only in orange-colored cans with above trade-mark.

New York & New Jersey Lubricant Co.
165 Broadway, New York.
1430 Michigan Ave., Chicago.

Thousands of Car Owners All Over the World Are Using Blue Ribbon Goods



Blue Ribbon Metal Polish
Blue Ribbon Nickel Polish
Blue Ribbon Auto Body Gloss
Blue Ribbon Radiator Leak-proof Cement

All BLUE RIBBON products strictly high class and fully guaranteed. BLUE RIBBON moves quick for the dealer—works fast for the consumer.

Ask for sample, giving us name of Dealer or Jobber

INTERNATIONAL METAL POLISH COMPANY

Quill and Naomi Streets, Indianapolis, Indiana
W. A. Blackburn, Eastern Distributor, 335 Broadway, Moffat Bldg., New York



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15,000 Trade Interests

READ THE

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You can secure your monthly audience with all buying and selling heads in all concerns in every branch of the automobile industry through the Accessory and Garage Journal. Such interests must know what you have to offer. All are logical prospective purchasers. They constitute your market and are always looking for lines of merit.

In this magazine the large and small manufacturer has equal opportunity to reach the whole trade and can secure a service equal to that of a trade mailing list and better than can be secured through any other medium.

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Every order carries with it a positive guarantee of service stated, and this in any form requested.

Ask how we give concern and product listing under proper classification in Buyers' Guides that have a distribution of more than 1,100,000 copies yearly. This service is free. Our trade mailing list is 100 per cent. active—Do you need it? Details gladly furnished on request.

Next issue Feb. 28th.

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TIMES BUILDING, PAWTUCKET, R. I.

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(BUYERS' GUIDE—Continued.)

TIRES—SOLID AND COMMERCIAL.

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Polack Tyre and Rubber Co., 246 W. 59th St., New York City. (Polack.)
United States Tire Co., Broadway and 58th St., New York.
Branches: See Rims—Removable and Detachable.

TOPS AND ATTACHMENTS.

Springfield Metal Body Co., 20 Medford Ave., Springfield, Mass.

TROUBLE FINDERS.

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Branch: 1974 Broadway, New York.

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Connecticut Steel & Wire Co., Hartford, Conn.

TUBING, GAS.

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

VALVE LIFTERS.

Winsor Manufacturing Co., Providence, R. I.

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VULCANIZERS.

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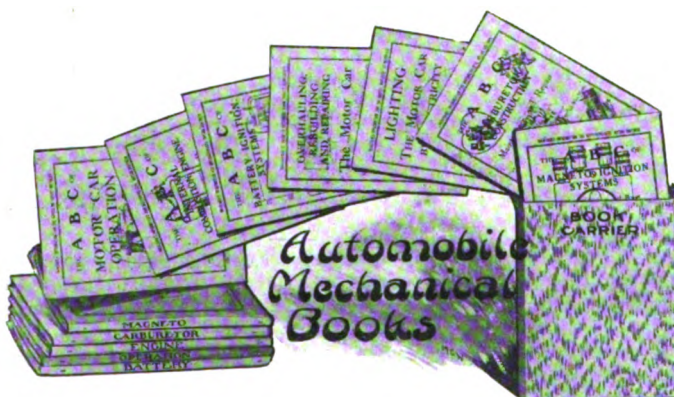
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THE AUTOMOBILE JOURNAL PUBLISHING COMPANY
Times Building Pawtucket, R. I.



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DETROIT, MICH. U.S.A.
October Seventeenth,
1913.

CFT-GB.

Mr. T. J. Daley, Sec'y,
Standard Woven Fabric Co.,
Framingham, Mass.

Dear Sir:-

On account of the satisfactory results obtained from tests of the Multi-bestos Brake Band Lining we have signed, and are enclosing herewith, our contract for 150,000 ft. which is our approximate requirements for one year.

Respectfully

Packard Motor Car Company.
C. J. Tollgen
Purchasing Manager

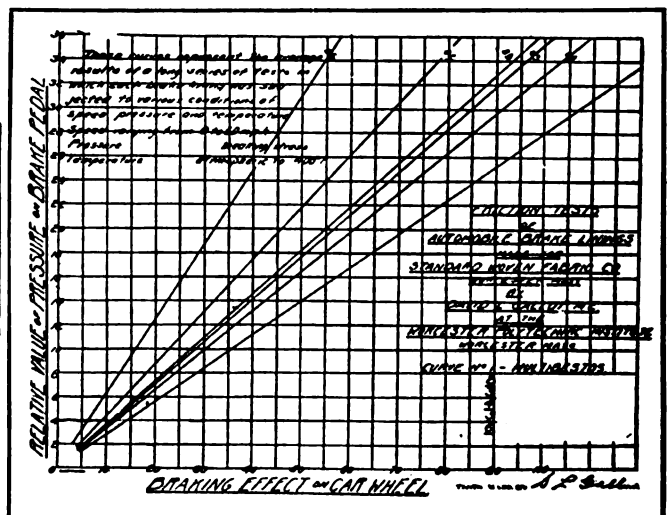
Why

The Chart shows the results of a series of tests conducted for us at the Worcester Polytechnic Institute to determine the relative superiority of Multibestos over five other leading brake linings. Just exactly how much superior Multibestos is in various braking qualifications is shown by the chart.

The figures from 0 to 36 represent units of pressure on the brake pedal. Figures from 0 to 100 represent the braking effect on the car wheel.

So, taking 16 units pressure, Multibestos shows a braking effect of 57; the other linings from 48 on down to 26 or from 85% down to 45% of the efficiency of Multibestos.

Insure the safety of the cars you sell by seeing that they are Multibestos equipped.



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APR 28 1914

VOL. XXXVII.

NO. 2.

AUTOMOBILE JOURNAL

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10 cents the Copy

PAWTUCKET R.I.

February 25, 1914

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BUT—If you need new bearings after a season's run, the repair bill hurts, doesn't it? Probably you blame the bearings or the car manufacturer or your repairman, though almost always the fault is simply poor lubrication. A little care at the start would have avoided it.

PANHARD OIL is refined from Pennsylvania crude. It is thoroughly filtered and purified. It has a heavy lubricating body at high temperatures. It will practically end bearing troubles. Your dealer has it or will get it for you. Send for our new booklet, "The Oil Question", now.

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Miller 1914 Porcelain Spark Plug

Guaranteed 15c Each Guaranteed

To introduce our 1914 Miller Guaranteed Porcelain Spark Plug at our exhibit at the Boston Automobile Show, to be held in Mechanics' Hall, March 7th to 14th, space No. 435, we will sell this plug at 15c each. Not more than six plugs sold to any one at this price.

25c Each At Our Branch Stores
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This Low Price Is Made to Introduce It. We Are Charging This to Advertising.

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The Oldest and Largest Automobile Supply House in America
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Automobile Equipment, Parts, Supplies, Accessories and Conveniences
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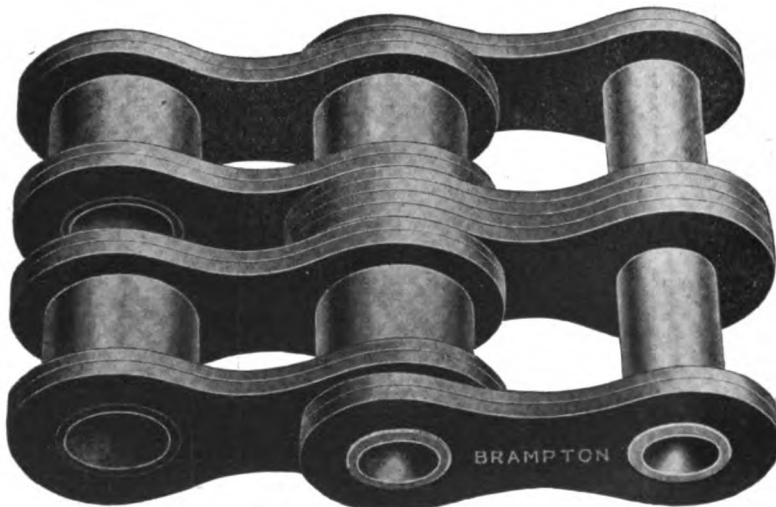
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SERVICE Whatever you want, we have or will get it for you. If we cannot supply your requirements, it is not made. STOCK

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Established 1896 Pioneer Jobber
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Made in Three Densities—
LIGHT, MEDIUM, HEAVY.

Get our Special Introductory prices on Miller's Pan-American Grease and Oil at the Show; also at our store, 202 Columbus Ave., Boston, Mass.

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POWER**



**SAVES
WEAR**

**SAVES
TIME**

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Miller's Pan-American Motor Cylinder Oils

are refined from the finest grade **Pennsylvania Crude** and are a pure, distilled, highly filtered mineral oil.

Guaranteed the equal of any High Grade Oil on the market at any price.

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Our business extends wherever power driven vehicles are used. Miller's guarantee covers everything purchased from us, which means price, quality and service.

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GET A NEW HEINZE FORD SPECIAL
WE WILL EXCHANGE WITH YOU
BIG ALLOWANCE COILS GUARANTEED

YOUR OLD COIL **FOR A NEW ONE**

SWAP

AN OPEN LETTER TO FORD OWNERS AND DEALERS

MR. OWNER MODEL T FORD CAR:—If your coil is getting old, not working as it should, or has been damaged, send it to us and we will promptly make an exchange with you, and give a brand new, guaranteed coil, perfect in every particular, and one of our regular Ford T Specials.

Our allowance will be the same on every coil received and the exchange will be on one basis for one or 100 coils. Get our price---You will swap and do it quick. You can't even afford to think of repairing your old coil.

MR. DEALER:—Get your old coils together. Write us the number and we will do the rest. All coils carry our regular guarantee. Make your sales and replacements accordingly. You receive such an offer once in a lifetime. It will make business and money for you and satisfy your customers.

WE RESERVE THE RIGHT TO WITHDRAW THIS OFFER AT ANY TIME

CONSTRUCTIONAL DETAILS OF THE TYPE B-52-6 COIL, FOR MODEL T FORD CARS

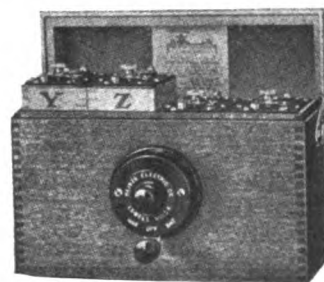
The Heinze coil is specially designed to operate with the Ford Flywheel Generator. Owing to the special windings, vibrator and general construction, we guarantee its efficiency when used in conjunction with the Ford Flywheel Generator only.

Vibrator is rapid and positive in action, assuring a volume of sparks at the highest points of compression. The magnetic pull on our vibrator is intensified by our patented magnetic shields. This means a more violent interruption of the primary current, and, as the efficiency of the secondary depends on the interruption of the primary, the superior efficiency of this coil can easily be understood.

Our method of winding not only gives a hot spark, but the special balancing gives unlimited service without pitting or burning of the platinum points. This obviates the necessity of readjusting. Our units will start the motor with less cranking than any other coil made and are much more efficient and smoother running than any master vibrator.

The Heinze coil consumes less current than any other coil made, making possible the use of two 16 candlepower electric headlights in series with the flywheel magneto circuit, and without interfering with the efficiency of the coil.

The Heinze coil will operate at any engine speed of from 200 to 2000 revolutions a minute, at any position of the adjusting nut, as the new adjustment is limited to two and one-half turns and is absolutely fool proof.



HEINZE ELECTRIC CO., - - - Lowell, Mass.

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FOX AUTO SEARCHLIGHT

The
Control
That
Prevents
Road
Accident



The
Control
That
Shows
All
Dangers

Cut Showing Fox Light Attached to a Demonstrator Car of the Fox Auto Searchlight Co.

THE LIGHT THAT NEVER FAILS

Independent action of either lamp is shown by position of right light.

The FOX AUTO SEARCHLIGHT converts your fixed lamps into road searchlights. No New Lamps Required, all moving parts are inclosed and there can be absolutely no rattle or vibration. IT IS A THOROUGHLY TESTED, PRACTICAL EQUIPMENT, easily installed, and it improves the appearance of any car. The FOX AUTO SEARCHLIGHTS are a necessary protection for the motorist and for all users of the road, furthermore a comfort and great convenience for every one driving at night.

The device illuminates the curves and corners automatically. It illuminates the sides of the road, showing the driver persons, crossings, bridges, obstructions, washouts, etc., which with the present auto lamps cannot be seen on curves. In addition the lamps may be instantly controlled by hand from the driver's seat independent of the steering gear, so as to throw the light across curves or corners before reaching them, or if desired, to illuminate in this manner ruts, ditches, washouts or other obstructions by the side of the road, to find cross road signs, street names, house numbers, etc., or to deflect the glaring light when passing another car—every motorist knows how all important this is.



DRIVERS MUST SEE BEFORE THINKING AND ACTING

From the standpoint of safety you can no more afford to be without the Fox Swivelling Headlights than without the horn which sounds the warning—both are essential to safe travel.

THE INVENTION WHICH IS PROTECTED BY STRONG BASIC AMERICAN AND FOREIGN PATENTS IS MANUFACTURED BY EXPERT WORKMEN AND BY UP-TO-DATE MACHINERY, IS MADE FROM THE BEST MATERIAL AND IS GUARANTEED TO GIVE ENTIRE SATISFACTION. The great value of the device makes it an easy seller. Auto owners can develop a remunerative business in connection with regular use of their machines by demonstrating the Fox lights.

A FEW GOOD REGULAR AGENTS ARE WANTED, TO WHOM DEMONSTRATION EQUIPMENTS WILL BE FURNISHED AT A NOMINAL PRICE.

WRITE OR WIRE FOR AGENCY PROPOSITION. YOUR TERRITORY MAY BE OPEN.

FOX AUTO SEARCHLIGHT CO., 78 Fountain St., Providence, R. I.

A Demonstration car equipped with Fox Auto Searchlights will be shown at our stand, No. 325, at the Boston Show, March 7 to March 14, 1914.

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Garage Men Realize the Value of Dover Products

Electric Light Bulb Carrier



Made of extra heavy steel **without a seam.**

Will carry extra bulbs **safer** than ones in the car.

Bulbs held in place by brass springs and new

locking device. Cannot work loose—Put in and removed instantly.

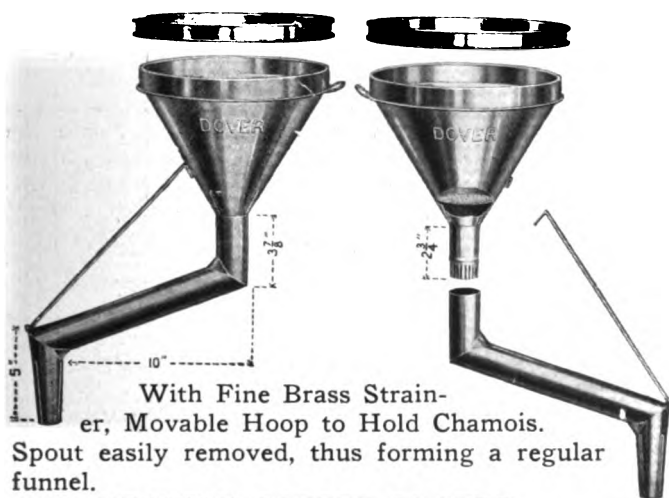
Garage Soap Economizer



Reduces soap consumption **one-half—Saves all waste—Prevents theft.**

Simply fill with four to six pounds of soap, suspend by chain or cord in water washing tank or barrel.

TWO-IN-ONE OFFSET GASOLINE FUNNEL



With Fine Brass Strainer, Movable Hoop to Hold Chamois. Spout easily removed, thus forming a regular funnel.

HEAVILY COPPER PLATED.

Galvanized Garage Funnel



First practical Garage Funnel of large capacity (10 qts.) at a popular price.

The Strainer of re-enforced 100 mesh Brass Wire Cloth, is removable, to prevent breaking, can be easily replaced and is of a new cone shape, a great advantage in giving a larger straining surface, and tending to prevent dirt and water from being forced through.

DOVER
STAMPING &
MFG. CO. CAMBRIDGE,
MASSACHUSETTS



**Wrenches Are Made Right, Stay Right,
Last a Lifetime, and are 30% Stronger
Than Any Other.**

**"COES" on any Wrench Means Quality,
Best Material and Finest Workmanship.
An Inspected and Tested Wrench. The
Ironclad "COES" Guarantee for Strength
and Finish.**

**The "COES" Automobile Model are for Motorists
and Repairmen. For Service Specify "COES" No
Tool Kit or Repairshop is Complete Without One.**

**Ease of Handling Without Fear of Slipping or Bruis-
ing. Perfect Balance and Certain Grip has made the
"COES" the Most Widely Used Tool of the Kind in
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WHOLESALE ACCESSORY SUPPLY
HOUSE IN THE NEW ENGLAND STATES
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SPLITDORF APPLE-ELECTRIC CO. RAYFIELD
MAGNETOS CARBURE-
TORS



DEALERS: Our store has been entirely remodeled to meet the requirements of the wholesale trade---so that prompt service can be obtained at all times. As we are the first accessory house in New England to take this move for the protection of the dealers, may we not reckon you among our customers?

**BI-MOTOR EQUIPMENT CO.,
180-182 MASS. AVE., BOSTON, MASS.**

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ABOVE THEM ALL



EAGLEINE NO-KARBON AUTO OIL- C THAT K

When Writing to Advertisers, Please Mention The Automobile Journal.

EAGLEINE OIL

is the

Better Oil

The reputation of Eagleine No-Karbon Oil as the best oil in America for water-cooled cars, has not been gained by extravagant advertising or loud shop talk by salesmen, but by the large and ever increasing number of users, who unsolicited have testified to the wonderful results attained by the use of our oils.

BELOW WE PRINT ONE TESTIMONIAL FROM OUR FILES:

Eagle Oil & Supply Co.,
Boston, Mass.

Cambridge, Mass.
Feb. 9, 1914

I shall send you tomorrow by Savage & Sons' Express an order for your Eagleine No-Carbon Cylinder Oil, suitable for my 4 cylinder Stevens-Duryea motor. Please send bill to me direct.

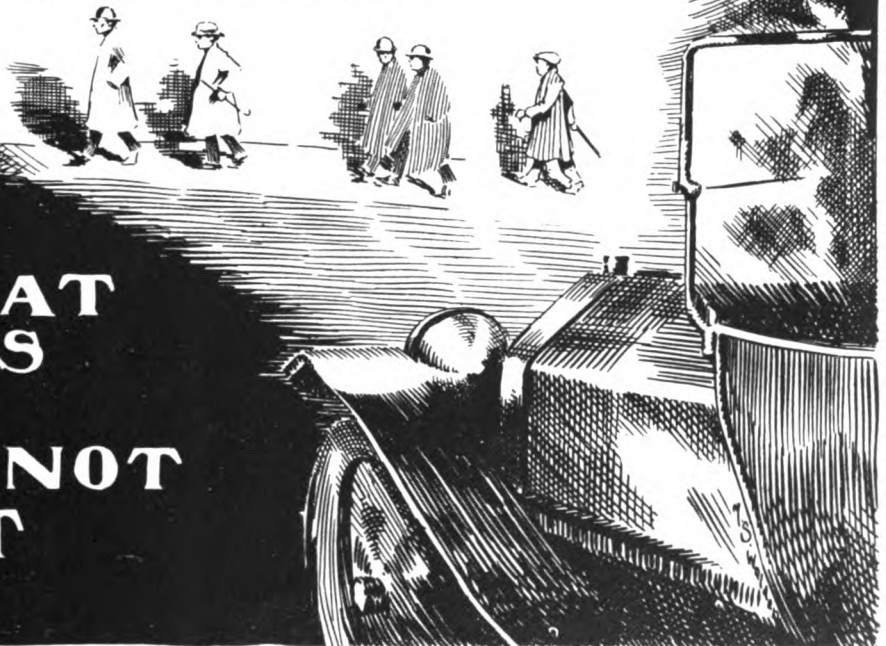
A friend coaxed me away from you, but carbonized spark plugs, and engine trouble drove me back.

Yours truly,
Albert S. Parsons.

May we not send you our booklet describing this oil, and a copy of several letters from our enthusiastic users?

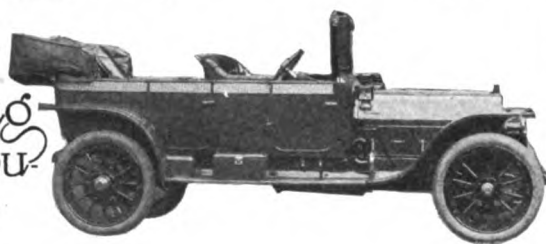
Eagle Oil and Supply Company
104 Broad Street, Boston, Mass.

THE
OIL THAT
SUITS
&
DOES NOT
SOOT



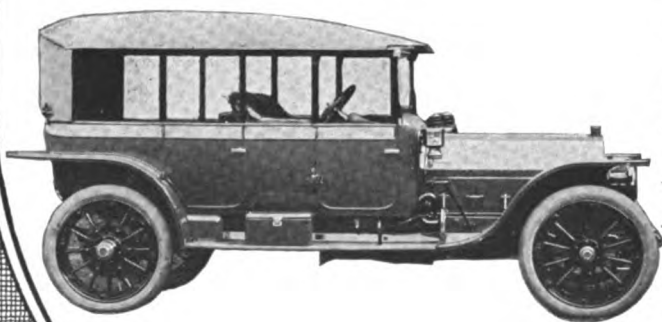
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The comfort of every car body combined. An instantaneously convertible equipment that affords a touring body or a limousine whenever desired.



Changes can be made on the road as readily as in the garage. No matter what the occasion or requirement, your car with the

SPRINGFIELD CONVERTIBLE BODY is always ready and always has



the accommodation and protection you desire.

Can be raised or low-

ered as easily as folding top.

SPRINGFIELD METAL BODY CO.

SPRINGFIELD

MASS.

GRAY & DAVIS

STARTING-LIGHTING SYSTEM

FOR FORD CARS

Gray & Davis announce a starting-lighting system for FORD cars. This new system is very compact, and can be installed in a few hours by any garage man or automobile mechanic. It is extremely simple in design and construction and possesses GRAY & DAVIS quality in material and workmanship.

Gray & Davis Ford System Includes Edison Battery

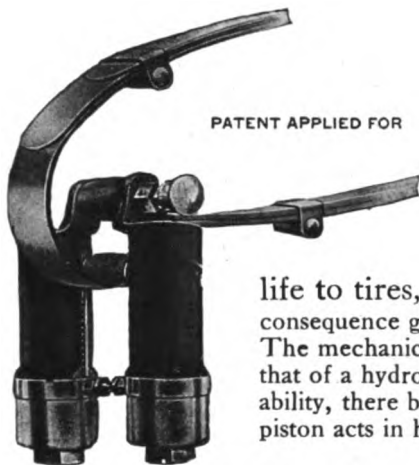
To Ford Dealers

Every prospective and present owner of a FORD will be interested in this starting-lighting system. We believe there will be a very great demand. We suggest that you write for our proposition to Ford dealers.

GRAY & DAVIS, Inc.

Boston, Mass.

J. H. S. SHOCK ABSORBERS



are a revelation as well as a revolution in spring suspension.

Their sensitiveness of action **AUTOMATICALLY** takes up and destroys jars and jolts, either heavy or light, and to the occupant of a car it seems like riding on air—fairly floating through space.

Vibration is eliminated, thus giving long life to tires, motor, transmission and other components. In consequence greater speed is possible, as the car does not tend to skid or roll. The mechanical principle of the J. H. S. Shock Absorber is as scientific as that of a hydro-carbon engine. A cylinder and piston are used to insure durability, there being no fragile parts to wear or easily get out of order. The piston acts in harmony with coiled springs which destroy all shocks.

PRICE—\$15.00 AND \$25.00 A PAIR

ATTRACTIVE OFFER TO FORD OWNERS

**30 DAYS'
FREE TRIAL**



**ONE YEAR
GUARANTEE**

SAGER EQUALIZING SPRINGS

**NINE YEARS OF
PROVEN SUCCESS**

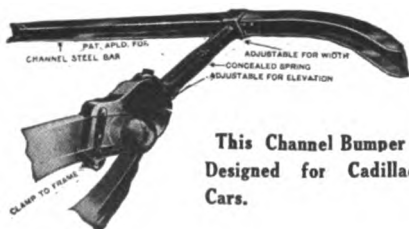
Endorsed by these prominent manufacturers:

Franklin Rambler Saurer Dorris Atterbury Maxwell KisselKar Stoddard-Dayton Stewart
Pope-Hartford Oldsmobile Autocar Elmore Columbia Crawford Logan Lippard-Stewart

SAGER QUALITY BUMPERS

Forty models—Channel, Square, 1½" and 2" Round, Ford Special, clamped on.

**Pierce-Arrow, Packard and Others
USE SAGER BUMPERS**



This Channel Bumper
Designed for Cadillac
Cars.



DIAMOND BUMPER
Suitable for All Cars

Prices \$6.50 to \$25.00

Liberal Discounts

J. H. SAGER COMPANY, 271 South Ave., Rochester, N. Y.

NEW ENGLAND DISTRIBUTOR

F. SHIRLEY BOYD, 903 BOYLSTON STREET, BOSTON, MASS.

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\$485 The Salvador Cyclecar \$485

MOTORCAR VALUE AT CYCLECAR PRICE
PLAZA MODEL
BOULEVARD-ROADSTER TYPE

Salvador has arrived a little late, but is moving fast in the streamline of quality.

The advent of The Salvador Cyclecar marks the finish of two years investigation of small car conditions in Europe and America.

The Salvador Car is designed by G. B. Mansur of Boston, who has been identified with manufacturing and selling of automobiles for 12 years. Mr. Mansur's association with The De Dion Bouton Co., of Paris, and his varied experience in American manufacturing, has enabled him to embody the best of European Cyclecar Models in The Salvador Cyclecar, to meet the practical requirements of the American Trade.

His beautiful Luxembourg exterior design in The Plaza Model meets every requirement of quality trade.

***Four Cylinder Water Cooled Engine,
 Selective Transmission, Shaft-Driven
 Car Is the Answer to Practical Cycle-
 car Requirements.***

Salvador Specifications insure the owner the utmost in motoring combined with all the comforts and refinements of a high priced motor car.

NOTICE TO DEALERS

The Salvador Motor Co. plans a limited output for 1914. Absolute deliveries to begin April 10, 1914. Correspondence and bids for territory solicited. The Salvador Motor Co. gives an absolute guarantee covering material and workmanship on the Salvador Cyclecar.

SPECIFICATIONS.

MOTOR—4-cylinder, 4-cycle, 15 horsepower, water cooled, L head 70mmx100mm. Cast enbloc.

LUBRICATION—Self-contained, constant level splash and force system, plunger pump operated by camshaft.

COOLING—Water cooled, thermo-syphon system.

TRANSMISSION—Unit, with motor, crucible steel gears, double heat treated, oil hardened, running on ball bearings, three speeds forward, one reverse.

CLUTCH—Simple cone clutch, three-spring adjustable type.

FRONT AXLE—Tubular, with drop center, conventional type.

REAR AXLE—Bevel gear drive, patented non-skidding differential.

STEERING GEAR—Worm and sector type, with 15" steering wheel.

FRAME—Pressed steel, channel section.

SPRINGS—Front, $\frac{1}{4}$ elliptic; rear, cantilever.

WHEELS—Wire, 28x3 tires.

WHEEL BASE—100" wheelbase, 42" tread.

CONTROL—Left hand drive, center control.

GASOLINE—Gravity feed tank, located under cowl.

BODY—Luxembourg design; boulevard-roadster type, streamline effect; Staggered seats with ample leg room; luxurious upholstery; parcel compartment in the rear.

SPEED—45 miles per hour. Plaza model, 65 miles per hour.

FINISH—Deep purple, black trimmings.

THE SALVADOR MOTOR COMPANY Factory, 28 Scotia St.
 Gen. Offices, 126 Massachusetts Av. **BOSTON, MASS.**
 ADDRESS ALL COMMUNICATIONS TO GENERAL OFFICES

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TWELFTH ANNUAL AUTO SHOW

Mechanics' Building, Boston

First Section

Pleasure Cars

AUSPICES

**Boston Automobile Dealers'
Association (Inc.)**

March 7th to 14th

**Opens Saturday Evening, March 7th, at 8.
Thereafter 10 A. M. to 10:30 P. M.**

Second Section

Motor Trucks

AUSPICES

**Boston Commercial Motor
Vehicle Association (Inc.)**

March 17th to 21st

**Opens Tuesday Evening, March 17, at 8.
Thereafter 10 A. M. to 10:30 P. M.**

**General Admission 50c Except Society Day,
Wednesday, March 11, \$1.00**

The Acknowledged Shows of the Year

**Pleasure Car Exhibit More Complete Than Ever Before. Only
Motor Truck Display of National Importance This Year. Both
Events Staged Amid the Most Superb Decorative Surroundings.**

Personal Direction CHESTER I. CAMPBELL.

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AUTOMOBILE ACCIDENTS

Show an alarmingly increased frequency due to the constantly augmented number of cars in use and crowded traffic conditions. No owner is immune. Careless pedestrians, heedless children, reckless drivers of other cars and horse-drawn vehicles—skids, bursting tires—a multitude of things conspire to increase the hazard of the road in cities, towns and in the country, and the most careful drivers frequently are victims. Then come

SUITS FOR DAMAGES

On account of real or alleged injuries or damage to property in which the average jury gives short shrift to the owner of the car. Every owner needs the protection of adequate

Liability and Property Damage Insurance

THE

MASSACHUSETTS BONDING AND INSURANCE COMPANY

T. J. FALVEY, Pres.

77-85 State St., BOSTON

UPON RECEIPT OF THE ATTACHED COUPON WILL
QUOTE RATES ON YOUR CAR FOR ITS POLICY CARRY-
ING A GUARANTEE WHICH HAS BEEN DESCRIBED BY
ONE SATISFIED OWNER AS

"100% LIABILITY PROTECTION"

**SUITS DEFENDED
SETTLEMENTS MADE OUT OF COURT
DAMAGES PAID WITHIN POLICY LIMIT**

MASS. BONDING AND INS. CO.
PLEASE DESCRIBE PROTECTION AND QUOTE RATES
FOR LIABILITY INSURANCE ON FOLLOWING CAR:

Trade Name and Type of Body	Model	Year of Make	Horsepower
Present Policy Expires		Name	
Address		Address	

77 STATE ST., BOSTON, MASS.

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CATARACT TIRE-SERVICE

4000 MILE GUARANTEE

**The greatest mileage
at the lowest
up-keep cost.**

The Cataract tires are to-day giving mileage second to no other tire on the American market.

Their success has been builded solely upon the superior construction of the tires.

Nothing but the finest of rubber and fabric enter into their make-up.

**Cataract Tires—The Tires
of Quality Built to Meet the
Demand of Efficiency.**

Let us prove superior construction by a thorough demonstration at Space 425, Section E, Balcony, Boston Auto Show

Cataract Rubber Company

General Offices: 66 Hereford Street, Boston, Mass.

BRANCHES

NEW YORK, N. Y.

FACTORY: WOOSTER, OHIO

PROVIDENCE, R. I.

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Atwater Kent Ignition

What Two of Thousands of Owners Have to Say

"Smoothest Running Motor I Ever Used Since I Replaced My Magneto With the ATWATER KENT SYSTEM."

"No trouble in starting in the coldest of weather, and can start on the spark. Have run 2100 miles on one set of batteries and they are still doing the work. Not a skip or a miss even when throttled down to a walk and on the high gear. As for power, I can climb hills on the high that made me drop to the second with my old ignition system. Am getting more mileage to a gallon of gas.

"I changed over to the ATWATER KENT SYSTEM because it is simple, first cost covers all costs, needs no adjusting like magneto breaker boxes and because I could install and time it.

"Since buying the ATWATER KENT SYSTEM I figure I have saved its cost in fuel alone, to say nothing of back breaking work I used to have when starting with the magneto system.

"My 1914 car is going to be ATWATER KENT equipped even if I have to put it on myself. It is the one satisfactory, economical system that you never have to think about after you put it on the car. That's comfort."

"Effects A Gain of 10% In Speed And Hill Climbing Ability Of The Ford."



Magneto Mounting.

"Your type F Unisparker outfit with attachments for Model T Ford car has been carefully installed on my car, and I would like to take this occasion to express my pleasure with the performance of this outfit.

"Formerly I had the four vibrating coils and timer which came with the car, and which derived its current from the regular Ford magneto. You know the troubles incident to a vibrating coil and timer outfit; and I decided to install one of your Unisparkers, with which I have had considerable experience in the past.

"Since installing your outfit I have gained approximately 10 per cent. in speed and hill-climbing ability, together with a sweetness of running which is a revelation to me in this particular car.

"This makes a nice combination for a Ford; inasmuch as I now use the entire magneto ability for operating electric lights and the ordinary dry cells for my Unisparker System.

"I am getting another car soon, and will also expect to install this same outfit in the new car as soon as it is delivered."



Ford Equipment.

Time and space prevents the publication of hundreds of other testimonials from which the above were selected. If you are interested in ignition it is worth your while to write for a copy of our Booklet L.

ATWATER KENT MFG. WORKS

4933 Stenton Ave.

PHILADELPHIA

When Writing to Advertisers, Please Mention The Automobile Journal.



"Used Here, There, Everywhere"

TELEPHONE OR TELEGRAPH ORDERS FILLED
IMMEDIATELY FROM OUR COMPLETE STOCK

MULTIBESTOS

Used on the Majority
OF THE

Highest Priced Cars

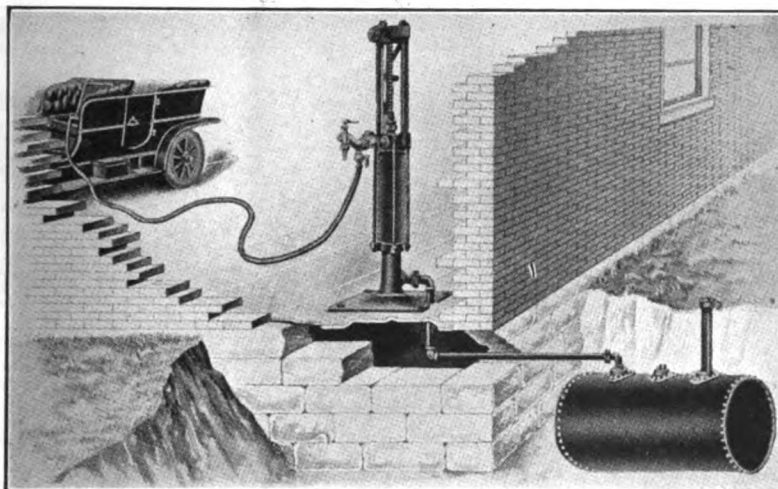
ALL SIZES CARRIED IN STOCK

F. SHIRLEY BOYD

903 BOYLSTON ST.

BOSTON, MASS.

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TEXACO OIL HANDLING EQUIPMENTS

PUBLIC GARAGE AND PRIVATE AUTOMOBILE OWNERS

Will Positively Solve Your Storage Problems and Earn You 100 Per Cent on the Investment.

They are Fire-Proof, Evaporation Proof, and Absolutely Safe.

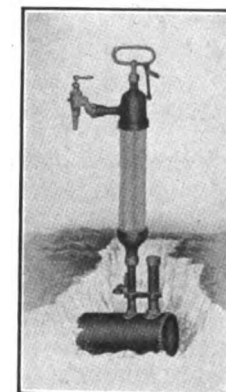
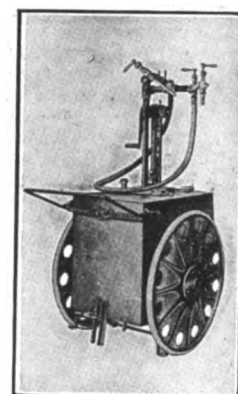
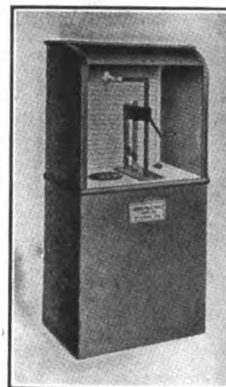
They Will Reduce Your Cost in Handling, Eliminate Waste, and Filter Your Oils.

Our complete line will be on exhibition at Space 433, in the Balcony, Mechanics' Building, Boston Automobile Show, March 7th to 14th and Motor Truck Show, March 17th to 21st.

THE TEXAS COMPANY

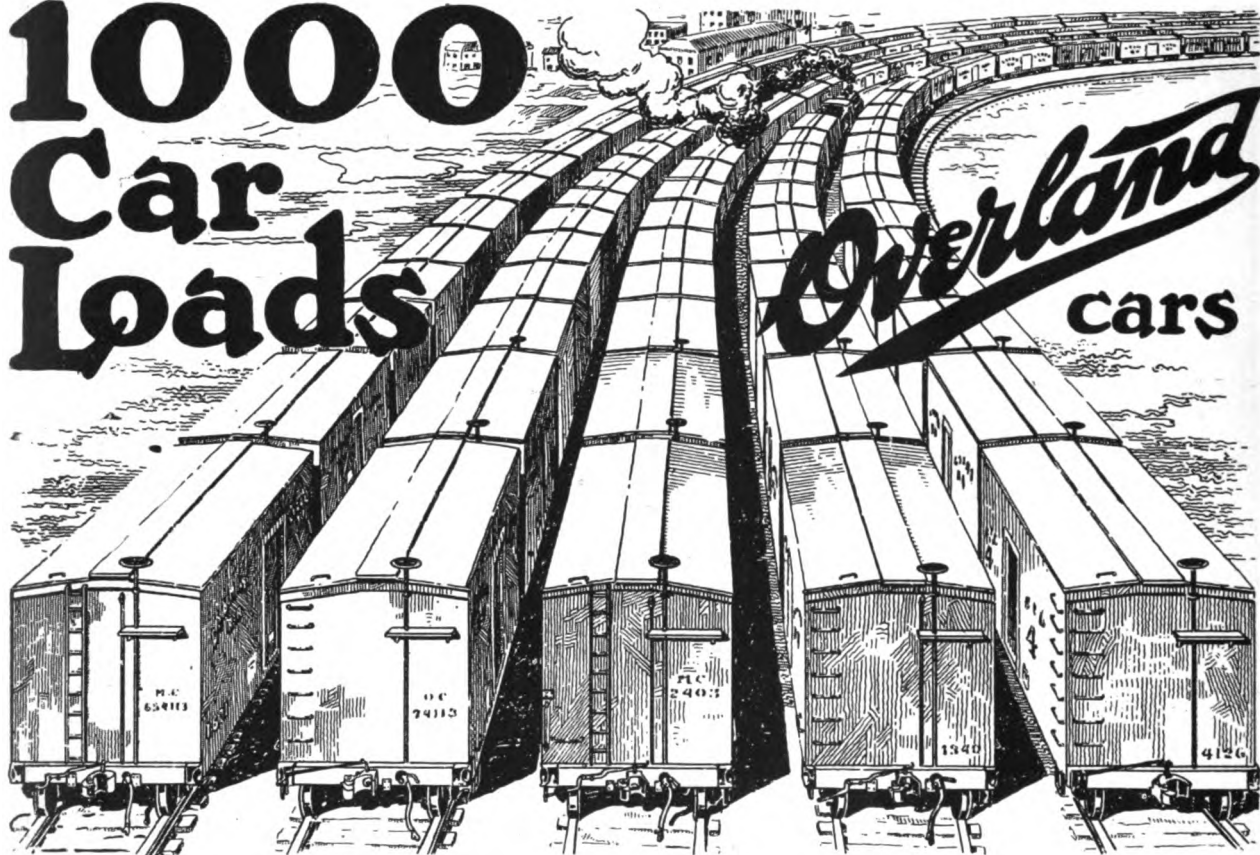
146 Summer Street

Boston, Mass.



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1000 Car Loads



For One Dealer

WE have one dealer who takes 1000 car-loads of Overlands every twelve months.

That's 5000 cars.

This dealer wired us a few months ago and wanted 7000 cars, but we could not supply them.

Other dealers take 2500, 2000 and 1500 Overlands apiece.

Even the 1500-car dealer takes more cars than the largest single factory in Germany turns out.

There are over 200 American automobile manufacturers who do not make in a year as

many cars as our one single 5000-car Overland dealer takes in the same period.

If you think this over for a moment these figures will mean something to you.

It certainly is reasonable to assume that we must be giving more car for less money than any other manufacturer in the business.

If we were not, we could hardly be doing the largest business.

That's sound logic.

If you will just take the time to make a few specification comparisons you will find the cost of the Overland is 30% less than that of any other similar car made.

Our catalogues will be sent on request. Please address Dept. 52

The Willys-Overland Company, Toledo, Ohio

Manufacturers of the famous Overland Delivery Wagons, Garford and Willys-Utility Trucks. Full information on request.

\$950

Completely Equipped

f. o. b. Toledo

Electric head, side,
tail and dash lights
Storage battery
35 horsepower motor

33x4 Q. D. tires
114-inch wheelbase
Mohair top, curtains and boot

Stewart speedometer
Clear-vision
windshield
Electric horn

\$1075

With electric starter and generator

f. o. b. Toledo

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BOSTON AUTOMOBILE SHOW

MECHANICS' BUILDING

MARCH 7-14

A Most Cordial Invitation Is Extended to Visitors at the Boston AUTOMOBILE SHOW to Visit Our Booth, No. 434, Main Balcony

OUR EXHIBIT WILL COMPRISE

Latest Types, Bosch Ignition

Special Ford Magneto

Special Ignition and Fittings

(For Cole and Oakland Cars Now Equipped for Battery Ignition.)

(Mounted on a Ford Engine That Will Be Constantly in Motion.)

Zenith Carburetors

(Latest Models.)

Leak-Proof Piston Rings

Mohawk True Quality Tires

Kemco Fan Generator Lighting Systems

The Men in Charge of Our Booth Will Be Fully Conversant with Ignition Subjects and Are Qualified to Give Expert Advice. To Demonstrate, to Answer Questions and to Offer Suggestions Is Their Business. They Are Wholly at Your Service.

We Invite All Dealers to Visit with Us and Become Acquainted with Our NEW PRICE SCHEDULES, Our Method of Service and Our Plan of Cooperation. Dealers Connected with Us Make Money; We Protect and Cooperate with Them.

MOTOR PARTS COMPANY

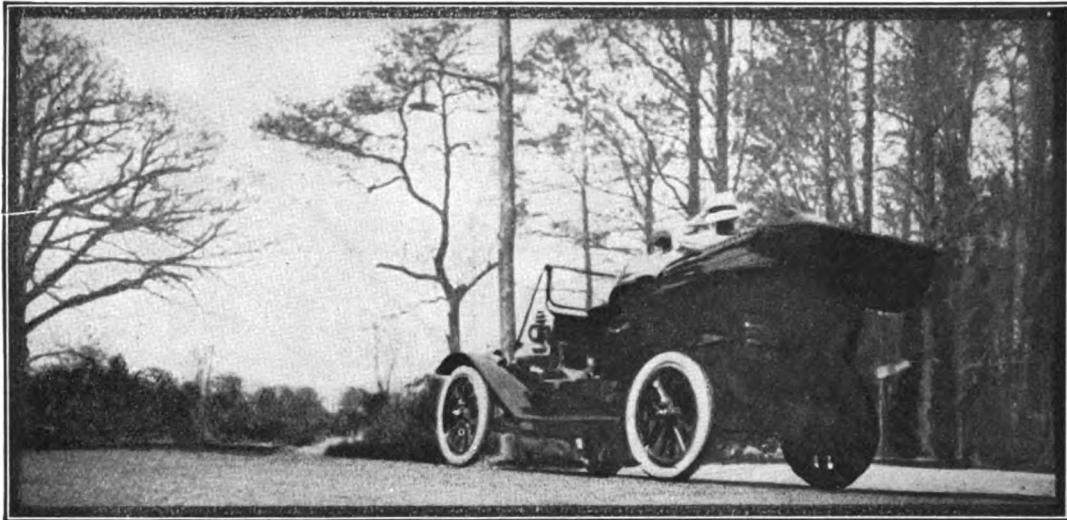
Official Distributors

818 North Broad Street
Philadelphia, Pa.

187 Columbus Avenue
Boston, Mass.

143 Chesnut Street
Springfield, Mass.

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THE JOY OF A RIDE

is complete when you don't have to worry about what's happening under the hood. Use

Polarine

The Frost-Proof Oil

It eliminates friction, wear and worry.

It cuts out carbon troubles.

It burns freely, yet never thins out.



Socony Motor Gasoline gives best results

For sale by all dealers, and

STANDARD OIL COMPANY
OF NEW YORK

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Say, Old Man

*If it's hot work in the winter,
what will it be in the summer? Take
my advice, and*

BUY A TRI-PHOON AIR PUMP

The Day of the Back Breaking Hand Pump and the Troublesome, Unperfected Power Pump is Past. Today It Is All For Convenience, Pleasure and Practicability. The Price Brings It Within the Reach of Every Car Owner.

Features of the Tri-Phoon Car Pump

Simple—durable—small—light—and can be attached to any make of car. Highest efficiency—can be operated at any speed without injury to working parts. Will deliver at 800 revolutions a minute a steady flow of fresh air equal to the pressure from an air tank charged at 115 pounds to the square inch.

Brackets and fittings are furnished for attaching to all the latest models. Driven by rotary cam. No leather washers used. Lowest in price, complete with fittings and every pump guaranteed to be perfect. Will last a lifetime.



Size 6" Long, 4" High, 4" Wide.

Features of the Tri-Phoon Garage Pump

Delivered ready for instant use. Small and compact—takes but little room in garage. No pressure tank as tires are inflated direct from pump. Either direct or alternating current motors furnished. Can be attached to any plug. Mounted on neat truck with handle. All garage pumps are made for heavy service. All are guaranteed.

PRICES FOR CAR AND GARAGE TRI-PHOON PUMPS

- | | |
|---|------|
| 3-Cylinder Air Pump, complete with hose and gauge..... | \$20 |
| 3-Cylinder Air Pump, complete with hose and gauge and brackets and gears for attaching..... | \$25 |
| 3-Cylinder Air Pump, Electric Driven, for Garage Purposes, direct current... | \$75 |
| 3-Cylinder Air Pump, Electric Driven, for Garage Purposes, alternating current... | \$80 |
| 6-Cylinder Air Pump, Electric Driven, for Garage Purposes, alternating or direct current..... | \$95 |

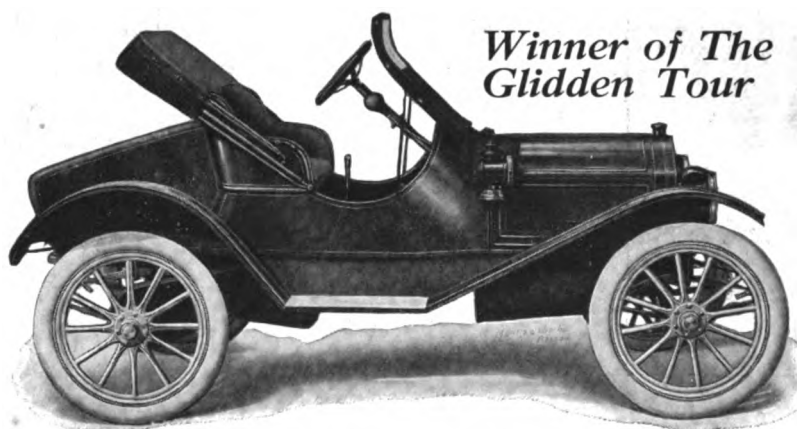
Write for Descriptive Matter

GREEN & SWETT CO., 737 Boylston Street
MANUFACTURERS BOSTON, MASS.



Cars, Like Men, are Known by the Company they Keep

The Metz "22" is probably the least-known car in the repair shops—and this speaks volumes in few words. It is so practical in design and so compact in construction that it easily over-rides the bumps and the road-wear that send other cars to the repair man. Confirmation of this claim is supplied generously by the result of the recent Glidden Tour, which was a clean sweep for the Metz.



Equipped Complete—1914 Improvements

METZ "22" \$475

The GEARLESS CAR—No Clutch to Slip, No Gears to Strip

In addition to being the lowest priced car on the market, the **METZ "22"** is the most economical in operation and up-keep. It will travel from 28 to 32 miles on one gallon of gasoline, 100 miles on one pint of lubricating oil, and from 10,000 to 12,000 miles on a single set of tires.

The **METZ** team of three cars was the **only** team in the recent Glidden Tour, from Minneapolis to Glacier National Park, Mont., to hold a **perfect score**, without ad-

ditional allowance or time extension of any kind, for the entire eight days of the contest.

The **METZ "22"** is a fully guaranteed car, with standard equipment, including 4-cylinder 22 ½ h.p. water-cooled motor, Bosch magneto, 30-inch artillery wheels, best quality Goodrich clincher tires, etc., etc., complete—no "extras". It makes from 5 to 50 miles per hour on the high speed, and its gearless transmission does away entirely with gear troubles.

We want a Representative in every City and Town. Write for Terms and Catalog "Q".

METZ COMPANY - WALTHAM, MASS., U. S. A.

CAN YOU START YOUR MOTOR ON THE FIRST TURN?

The Duelec Vaporizing Primer

MAKES IT POSSIBLE

With the Duelec, in zero weather, and with any kind of fuel—gasoline, kerosene, denatured alcohol, etc., the fuel is supplied to the cylinders in a hot, fuming, vaporized form, exploding with the first spark.

ALL YEAR NECESSITY

December as in June

Low grade fuel nor cold weather can bother

OUR OFFER:

Send \$2.00. We will forward a DUELEC for trial. If after 10 days you are not

convinced of its all around superiority over any similar device (regardless of cost), return and we will refund deposit. If highly satisfied, send us balance due, \$3.00.

WHAT THE DUELEC DOES

The principle of the Duelec is right. It raises the temperature of any fuel to a point where it vaporizes quickly, and mingling with the air provides a homogeneous mixture, one that will start the motor on the first turn, and in any kind of weather. The Duelec heating chamber is scientifically constructed, and by the use of a resistance coil heated by electricity, the fuel is converted into a fuming mist. This is drawn into the cylinders and exploded on the first spark. The Duelec is operated by any source of supply of current and consumes but a small amount.

Anyone can attach the Duelec in a few minutes. It is placed above the carburetor, and two wires lead to its terminals. It will operate on any six or twelve volt battery, etc., or on the Ford magneto. We supply resistance coils or heating chambers for any standard voltage. The Duelec is particularly adapted to cars using motor starters as it saves the battery. Owners of Henderson cars and others using heavy fuel can eliminate the gasoline supply by using a Duelec.

DEALERS---The best proposition on the market. Heavy demand assured on account of low price, and all-around superiority.

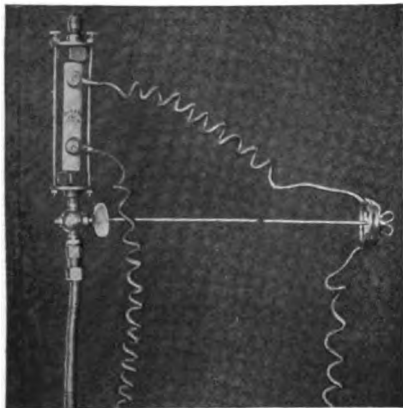
MANUFACTURERS OF STARTERS---Duelec included as part of equipment stamps A No. 1 efficiency on your primer, and converts it into an article worthy of the name, **STARTER.**

AUTOIST, AVIATOR, MARINER---Demand the Duelec from your dealer. If he cannot supply you, write direct, giving size of supply line, current voltage. If for Ford, whether to operate from the magneto or batteries. We fill orders for 1-4 inch supply line and for six volts unless otherwise specified.

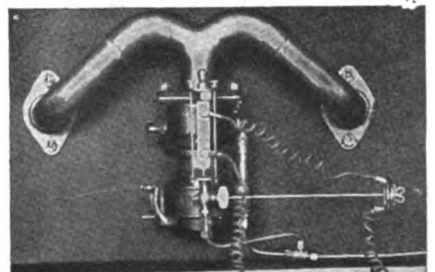
PRICE \$5.00.

**MAKE ALL REMITTANCES
PAYABLE TO U. S. TRAUB**

DUELEC (IMPROVED) VAPORIZING PRIMER
YONKERS, N. Y.



(Patent Applied For)



(Patent Applied For)

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WAITE AUTO SUPPLY COMPANY

Quality, service, price, delivery, backed by the Waite lived-up-to-guarantee, has made this the largest exclusive automobile supply house in New England.

Anything for the owner or the trade from a cotter pin to the most complete, private or public garage equipment.

Our jobbing connections extend everywhere. There are no limitations and no restrictions to our buying. All patrons are accorded the benefit of such purchasing facilities.

We specialize in quick delivery. Three minutes from every shipping line, either steam, electric or water.

FULL LINES

Rayfield
Carburetors
Mea Magnetos
Seamless
Tires
Success
Dry Cells
Garage Air
Compressors
Success
Spark Plugs



ALWAYS STOCKED

Klaxon
Electric Horns
Automobile
Springs
Machine and
Hand Tools
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A CORNER OF RETAIL DEPARTMENT.

We Solicit Your Patronage. Send for Latest and Largest Catalogue and Price Lists. A Postal Brings a Copy.

The Same Careful Attention Given to the Smallest Mail Order as to the Largest Purchase Made.

Telephone
Union 3711
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Waite Auto Supply Company
81 Exchange Street
Providence, R. I.

CABLE
"WASCO"



HARRIS

TRADE MARK REG. U.S. PAT. OFF.

OILS

AND

GREASES



The constant users of HARRIS OILS are those who know most about lubrication.

We find that unbiased dealers, garagemen, experts on the automobile, recommend HARRIS OILS. These oils represent *real* quality. They are as good as 28 years' experience can make them.

HARRIS OILS give more than satisfaction. They preserve the engine, add to mileage, reduce cost of maintenance and make the motor deliver its maximum horse power.

Made from the finest grade Pennsylvania Crude, for which we pay a premium, and refined by special process, these oils are free from carbon producing elements.

"A little goes a long way and every drop counts"

The Wiser Dealers Carry HARRIS OILS.

HARRIS CYLINDER OIL :—made in three grades, and sold in bbls., 5 gal. and 1 gal. cans.

HARRIS TRANS COMPOUND :—A transmission oil reduced to the consistency of a grease.

HARRIS MOTOR CAR SOAP :—an efficient soap which will not harm the finest surface.

WRITE FOR OUR DEALERS' DISCOUNTS.

A. W. HARRIS OIL CO.

326 S. Water St., Providence, R. I.

143 No. Wabash Ave., Chicago, Ill.



**DONT
THROW THEM
AWAY!**

**SAVE
80%**

Old Bearings made
like new for one-
fifth the cost.

**SEND US
YOUR WORN-OUT
ANNULAR BALL BEARINGS**

*We Will Regrind Them and
Make Them as Good as New
For One-Fifth the Cost of New Ones.*

Complete
Stock Reground
Bearings for
Immediate
Exchange, of All
Makes, at
Factory and All
Branches.



New Annular,
Thrust, Radax
and Double Row
Bearings and
High Grade
Steel Balls.
Special Bearings
Made to
Specifications.

AHLBERG BEARING CO.

2624 Michigan Ave., CHICAGO, ILL.

1786 BROADWAY, NEW YORK.
95 MASSACHUSETTS AVE., BOSTON, MASS.
805 WOODWARD AVE., DETROIT, MICH.

WADDELL

Say Good-by to your chains when you use the "Columb" tread

Russian engineers first worked out the counter-cross or reverse herringbone pattern *theoretically*, as a tread which *could not skid*. Then it was tried out practically on the steppes of Russia, over the smooth roads of England, in the mountains of Switzerland and Spain.

It was used on every type of car and under the severest conditions imaginable. *It worked; it would not skid*. It is one of the features which quickly made known throughout the world the name of the

PRO-WOD-NIK Columb Tread Non-Skid Tires

Pro-wod-nik Tires are quality tires, built on the principle that "the best is the safest and the cheapest" in everything pertaining to the running of a car. On the Continent and in Great Britain they are known to and preferred by every owner of a high grade car.

Pro-wod-nik Tires have a resiliency greater than that of any American tire. Every ply of fabric used in their construction is impregnated, by a special process, with pure Para, which gives the core the same elasticity as the tread. A layer of pure rubber compound between each ply of fabric binds the fabric together and further increases the *universal resiliency* of the tire. The side walls are of exceptional thickness and the construction of the bead is such that rim-cuts are unknown in Pro-wod-nik Tires.

Write for Booklet

Whatever make or grade of car you operate, you cannot afford not to know about Pro-wod-nik Tires. For safety and low mileage cost you will find them unequalled. Write for booklet and learn all about them.

Columb Tyres Import Company, Inc.
1891 Broadway and 71 Columbus Avenue
New York City



Boston Distributor—Park Square Motor Mart Garage

Write to one of the following distributors, if more convenient:

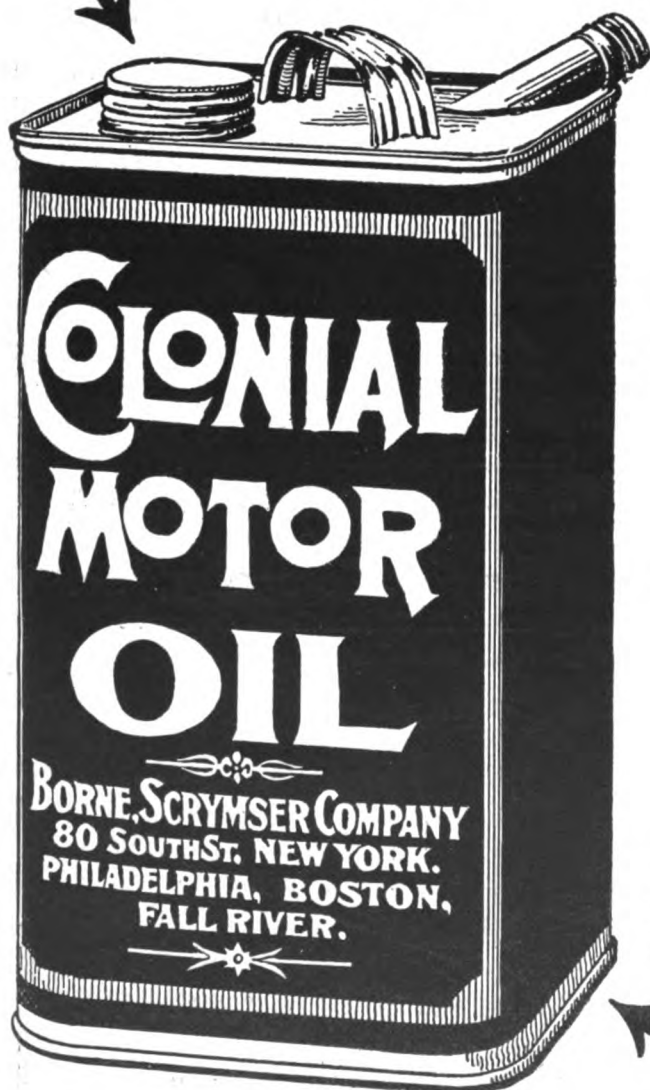
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California, Cal., Utica, N. Y., Poughkeepsie, N. Y.

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Makes Good

That's the essential element. That's the verdict of the users of Colonial Oil. That's why they always say Colonial---because they know it's

"The Motor Oil that Makes Good"



Use COLONIAL and
NOTE the DIFFERENCE

COLO GREASE

A real transmission grease

Will make your gears run smoothly and quietly because it is made especially for gear lubrication.

COLONIAL Timing Gear Oil

overcomes all trouble with your timing gear. Use it and

NOTE the DIFFERENCE

SILEX GREASE

The greasiest grease made

The real test of a grease is not its looks or the feeling but its lubricating properties. Silex is made to lubricate and last.



The Qualities I
want in Top
material I can
get only in
Pantasote

"I want a good-looking material.

"I want a material that looks well after long service—
as well as when new.

"I want a top material that won't FADE or become
shabby.

"One that is waterproof and remains waterproof.

"One that won't crack, peel off or chip off.

"A Material unaffected by sunlight or temperature
changes or grease.

"I want a material that can be easily washed clean with
soap and water.

"And lastly, I want to know that the material is made
and backed by a company of long standing and
reputation."

Pantasote

Pantasote

Pantasote

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Pantasote

Pantasote

These qualities and this satisfaction you *DO* get in *Pantasote*.

Write today for "What's What in Top Materials"

This book has invaluable information for the motorist. It rips open and dissects *all* kinds of
top materials—*Pantasote* included.

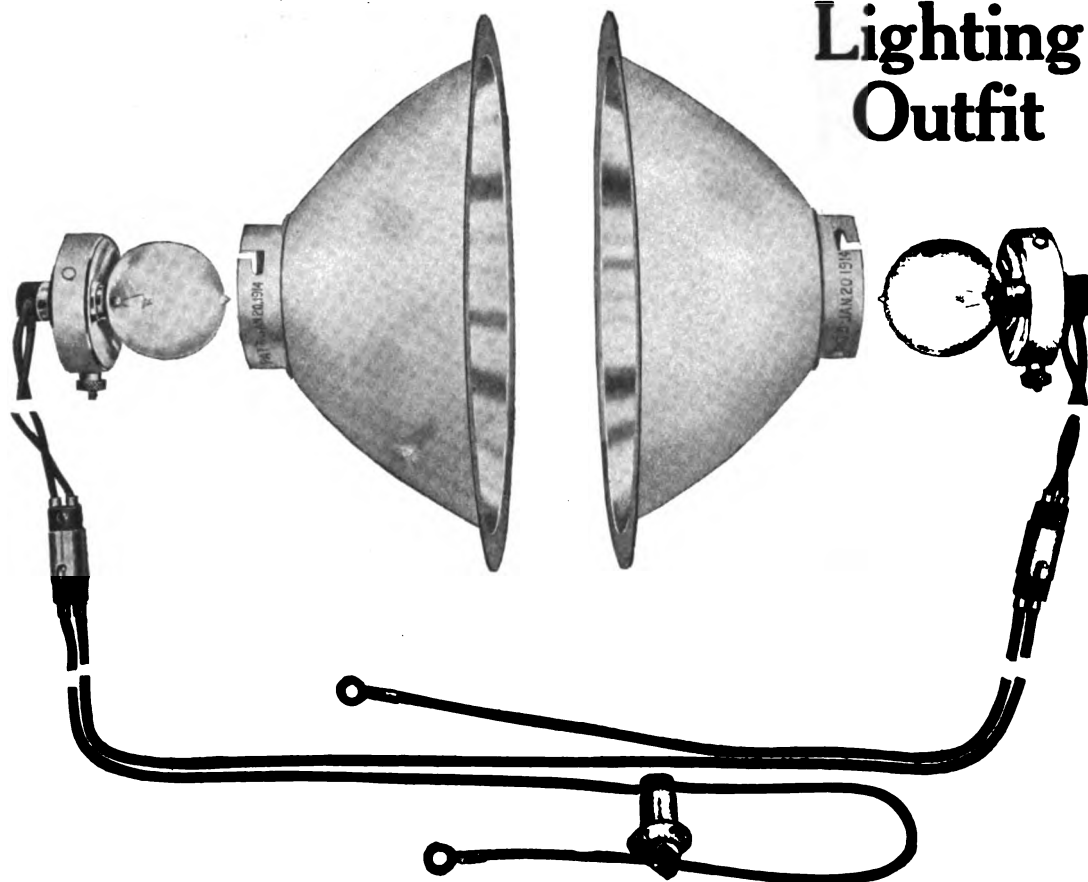
Write for it today and we will send it without cost.

THE PANTASOTE COMPANY, 212 Bowling Green Building
New York City

Look for this label on your Top—furnished free to top
makers with every yard of *Pantasote*.



Lighting Outfit



Operating Direct from any Ford Magneto

**This Outfit Consists of one pair of C-S Patent Reflectors,
Heavily Silver Plated, Together with the Necessary
Wires, Bulbs, Switches, Ediswan Connectors, Etc.**

ON EXHIBITION AT SPACE NO. 554 BOSTON SHOW

Special Proposition for the Trade

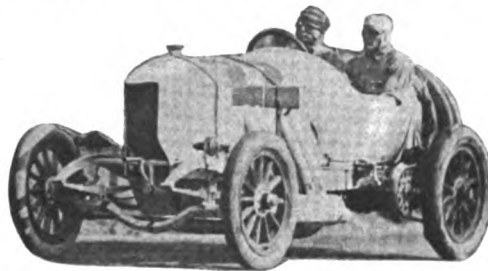
Culver-Stearns Manufacturing Co.
WORCESTER, MASS.

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BRAENDER TIRES



BRAENDER VICTORIES



De Palma's **BRAENDER EQUIPPED** Vanderbilt Cup Mercedes.

INDIANAPOLIS 500 MILES: May 30, 1913.—The first car that ever went through a 500 mile race *without a tire change* was Mulford's **Braender Equipped** Mercedes.

COLUMBUS 200 MILES: July 4, 1913.—Mulford in a **Braender Equipped** Mason broke the world's record by over 6 minutes, *without a tire change*.

ELGIN TROPHY, 301 MILES: Aug. 30, 1913.—Anderson in a **Braender Equipped** Stutz took **first place**. Mulford took **second** in a **Braender Equipped** Mason *without tire change*, using the same four tires that had already been through the Chicago Trophy, (301 miles), 100 mile race at Cincinnati, and 11 short races, making a total of **over 1100 miles racing on one set of Braender Tires**.

VANDERBILT CUP RACE, 294 MILES: Feb. 26, 1914.—DePalma took **first place** in **Braender Equipped** Mercedes, *without a tire change*, averaging 75.6 miles per hour. The Mercer, the Mason and the Stutz, all **Braender Equipped**, finished **second, third and fourth**.

GRAND PRIZE, 403 MILES: Feb. 28, 1914.—DePalma in a **Braender Equipped** Mercedes, takes **fourth**.

ASIDE FROM RACING:—Jack German's 22-passenger sight-seeing car operating in New York, is still using four **Braender Pneumatics** which have given over 6000 miles of service.

This is proof that **Braender Tires** excel in any kind of service.

SEE THEM AT THE BOSTON SHOW, SPACE 522

BOSTON DISTRIBUTOR: Dayton Tire Co., 589 Boylston St., Boston, Mass.
C. Mathison, Stamford, Conn. J. R. Johnson, Greenwich, Conn. Ketcham & Lowrie, Newark, N. J.

Braender Rubber & Tire Co., Rutherford, N. J.

1987 Broadway, New York, N. Y.

A Good Winter Actor



Model 7—

Has no clutch to be affected by cold contraction.

Has no gear case filled with chilled and nearly frozen grease.

Gets under motion just as easily in winter as in summer.

Rolls along smoothly and quietly in any weather and on any roads.

Has the tremendous leverage of the gearless transmission to assist the sturdy pull of the four cylinder engine.

Has a speed to suit every case and equal to any emergency.

Has electric starting, light, horn and complete equipment of accessories.

Cartercar Model 7 is almost more than you would expect for the money.

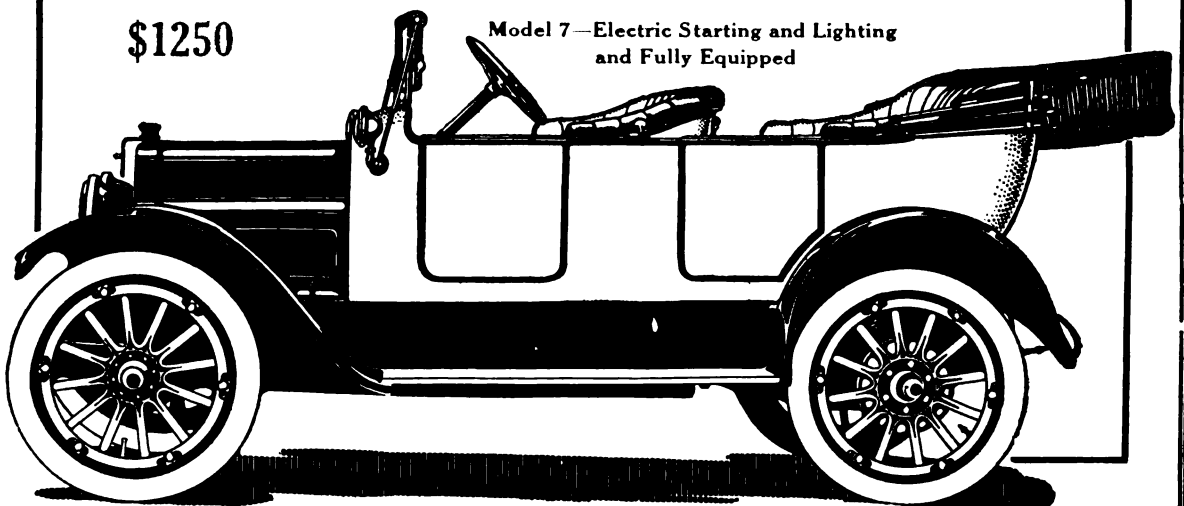
Phone our nearest Dealer and he will call for you in a Model 7.

Cartercar Company **PONTIAC MICHIGAN**

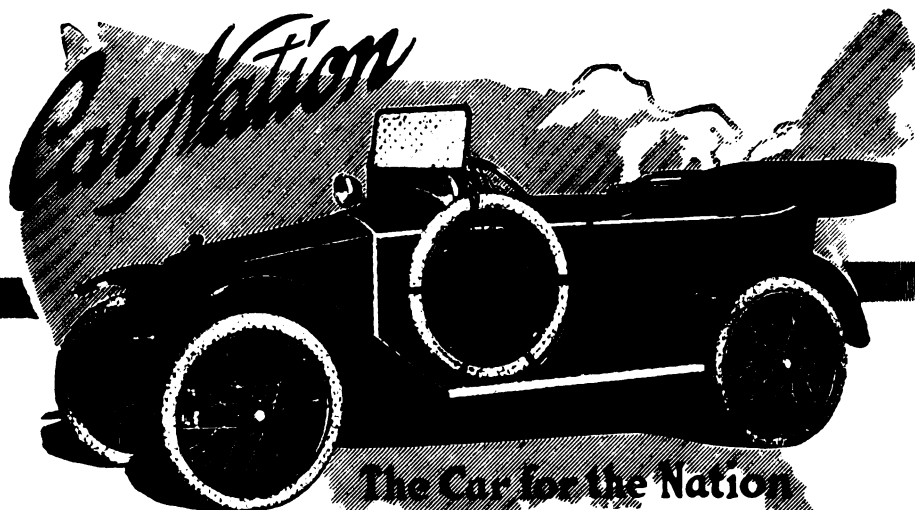
Branches at New York, Chicago, Detroit, Kansas City, Atlanta.
Dealers in All Principal Cities.

\$1250

Model 7—Electric Starting and Lighting
and Fully Equipped



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\$495
ROADSTER

The Car for the Nation

"More than a Cyclecar"

\$520
TOURING CAR

AS CATALOGUED

The Low Priced Car that in Design, Construction and Detail Ranks With Big Expensive Motor Cars

The Car-Nation is a car that any one would be proud to drive. It embodies all the "up to the minute" ideas in both European and American practice, while the price brings it within the reach of the great majority of buyers.

The light weight—great economy in operation—25-30 miles to the gallon of gasoline—ease of handling—low initial and upkeep cost—long life of the tires—speed and hill climbing qualities, make the Car-Nation unsurpassed for general utility.

There is nothing freakish about the whole car—every part is standard—four cylinder block motor—multiple disc clutch—3 speeds forward and reverse—selective type transmission—floating rear axle—wire wheels—left side drive—center control—in fact everything about the whole car has been approved as the best practice.

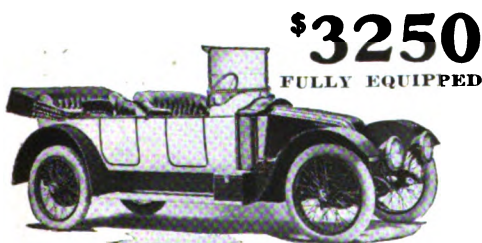
Dealers throughout the whole country can make a very advantageous agency connection by writing or wiring now.

The New "Six-48" Keeton

The Keeton has that distinctive French type of construction that has always made the strongest appeal to people of culture and refinement, both in Europe and America, as the criterion among motor cars.

The mechanical excellence of the Keeton and the completeness of the equipment insure the maximum endurance and comfort in use.

Write for "THE TRIPLE TEST" booklet.



The 7 passenger "Six-48" Keeton Touring Car

\$3250
FULLY EQUIPPED

MANUFACTURED BY

THE AMERICAN VOITURETTE COMPANY
DETROIT, U. S. A.

Boston Distributors: W. B. Doan & Co., 1112 Boylston St., Space 421, Boston Show

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Regal

The Distinctive Car for the Discriminating Buyer

THOUSANDS of Regal owners the country over will tell you that the exclusive Regal construction makes Regal cars the last word in safety, stability, comfort and economy.

Compare the Regal in these respects with cars at a higher price, if you will. But—and here's the real test—compare

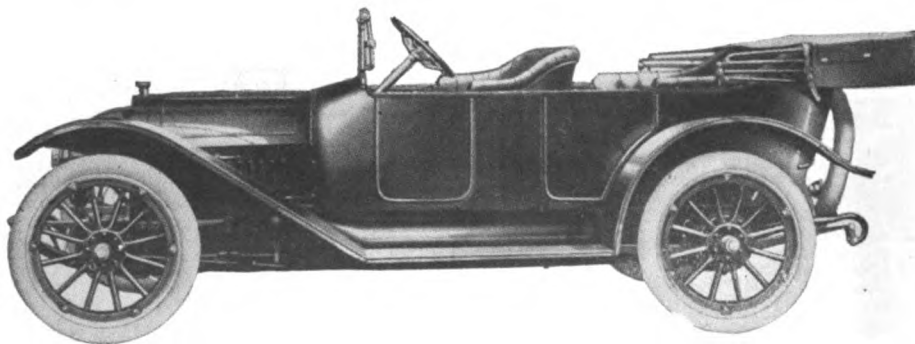
the Regal with other cars at about the same price.

1914 bids fair to be far and away the biggest year in Regal history.

For the Regal is—and will be this year more than ever—the easiest bridge between the dealer who wants a satisfied trade and the buyer who wants a satisfying car.

On exhibition at the Boston Automobile Show.

Regal Motor Car Company, 126 Piquette Ave., Detroit, Michigan



Model T, the Famous Regal Underslung
Five-passenger touring car, electrically started and lighted.
Completely equipped. Price, \$1,125 f. o. b. Detroit.

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VEEDOL

A Motor Oil made from Pennsylvania Petroleum
Most Lubrication **Least Carbon**

VEEDOL is being marketed to the automobile trade and widely advertised to the consumer during 1914 in connection with an attractive Agency proposition. Write for particulars.

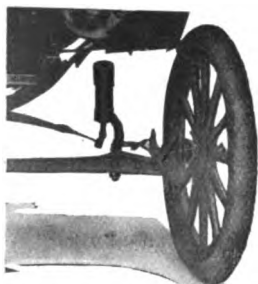
Exhibited at the Boston Automobile Show
March 7th. Space 500

PLATT & WASHBURN
REFINING COMPANY

7 Broadway

New York

Incorporated 1885



Attached to Front Spring of Ford Car.

Coxajusto
ADJUSTABLE TO ANY LOAD

SHOCK ABSORBERS

BOOTH 603

BOSTON AUTO SHOW

FOR

FORD CARS

Can Be Adjusted Instantly

A Quick Seller to All Owners. Liberal Discounts to Dealers.

See Demonstration of Cox Rebound "E-ZER" and the Cox Combination Welding and Decarbonizing Outfit.

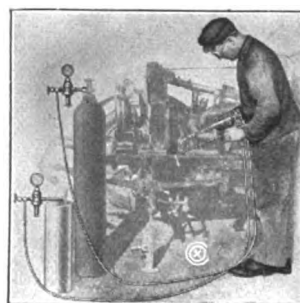
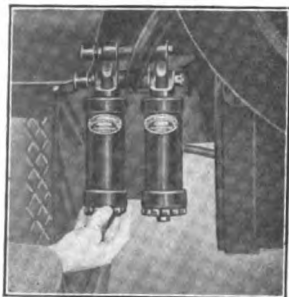
Cox Brass Mfg. Co.
Albany, N. Y.

Adjusting Coxajusto Attached to Rear Spring of Heavy Car.

Branches: New York City, Chicago, Detroit, San Francisco, Boston.



Attached to Rear Spring of Ford Car.



Welding with Cox Outfit.

THE UNIVERSAL
SAFE-DURABLE-CONVENIENT
AND ATTRACTIVE
ELECTRIC TAIL LAMP



Is a combination red danger signal light and a perfect number plate holder. Illuminating the rear number at night that meets the most exacting requirements of the law.

Can be easily attached to mudguard or body of any car. Artistic in design and finish and lends refinement to any machine.

Insures immunity from traffic officer, police court fines and trouble. Makes evening riding a pleasure.

Universal Lamps are sold by all leading dealers. If your dealer does not carry them in stock order direct.

All lamps are sold complete with Mazda two candlepower, six-volt bulb. Finished in all standard colors.

Combination Tail Light Co.

954 Tremont Street

Boston, Mass.

ALDING PORCELAIN PLUGS



Regular
75c Value

50c
EACH

Write for a gallon of the famous
"ALDING" OIL, in "DUCK" Can, 75c Delivered
ALSTEN & GOULDING COMPANY
36 Foster Street, Worcester, Mass.



**GEISZLER NON-SULPHATING
STORAGE BATTERIES**

Guaranteed perfect satisfaction or money refunded

SIZE 66 - \$20.00

GEISZLER BROS. STORAGE BATTERY COMPANY
514 West 57th Street, New York City

The Easiest Riding
Car in the
World

MARMON
NEW SERIES MARMON "32"
\$2850 to \$4100
THE MARMON SIX
\$5000 to \$6350

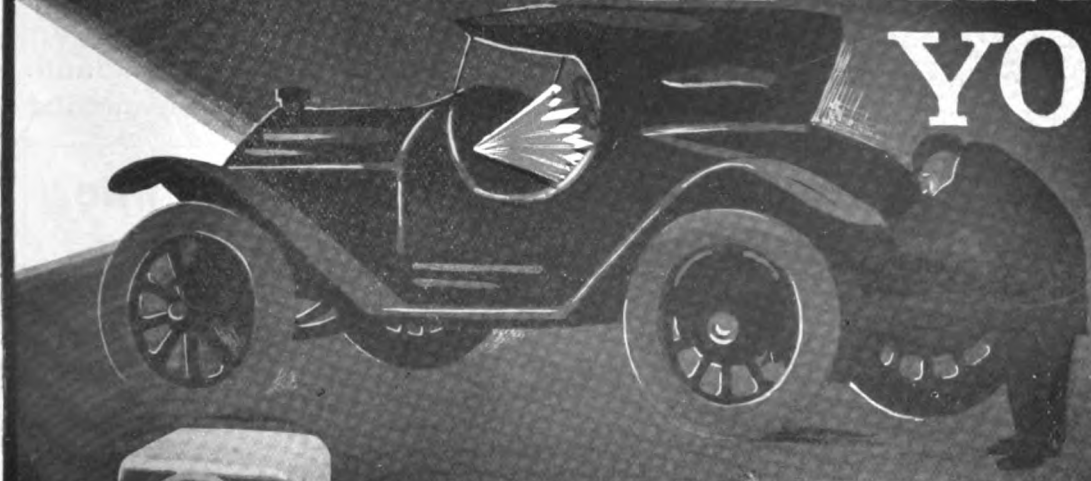
Thoroughly expressive of the
highest development of auto-
mobile design, materials and
construction.

F. E. WING MOTOR CAR CO.
"Motor Mart"
12 Columbus Ave. **BOSTON**
New England Dealers for

NORDYKE & MARMON CO., Indianapolis, Ind.

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THE RED EYE WARNS YOU



Always Before Your
Eyes While Driving

Right On the Dash BOSTON TAIL LIGHT DETECTOR

An Electric Indicator Actuated by Lamp Failure, or Defective Contact.

An Instantaneous Warning of Extinguished Tail Lamp That Insures Against Arrest and Fines and Protects from Danger of Overtaking Vehicles.

Positive in Operation, It Obviates Annoyance, Fines and Court Records. A Driving Necessity Guaranteed for the Life of the Machine, Constructed to Endure All Conditions of Motor Service.

So Simple Any Owner or Driver Can Install. Can Usually Be Connected in a Few Minutes. Used With Standard Lamps and Can Be Coupled With Speedometer or Dash Lamps, Without Additional Wiring.

Finished as Black-Nickel, Brass, Oxidized-Black and Nickel. Other Finish Furnished at Extra Price. A Necessity to Any Automobile.

PRICE \$5.00 PREPAID

Order Through Any Dealer or Supplied Direct from

THE HARDING SPECIALTIES COMPANY, INC.

755 Boylston Street, - - - BOSTON, MASS.

Special Vulcanizing Offer

There is no better time than NOW to put your tires into condition for running. We have the best equipped Vulcanizing Plant in New England. Every modern appliance, most expert workmen, the most approved method

Auto Tire Vulcanizing Prices

Sectional Repairs

2 ½ -inch.....	\$2.50
3 -inch.....	\$3.00
3 ½ -inch.....	\$3.50
4 -inch.....	\$4.00
4 ½ -inch.....	\$4.50
5 -inch.....	\$5.00
5 ½ -inch.....	\$5.50
6 -inch.....	\$6.00

Above prices are for 6-inch section. All over 6-inch add 50c an inch to above prices.

that has demonstrated its superiority over all others after 14 years' experience and ALL WORK GUARANTEED. In this work, as in every other branch of Auto Accessory and Equipment—WE EXCEL IN SERVICE TO THE AUTOIST. To make it an inducement for you to have your vulcanizing work done now, we make this offer :

Auto Tube Repair Prices

Under 2-inch.....	50c
From 2-inch to 6-inch....	75c
From 6-inch to 8-inch....	\$1.00
From 8-inch to 10-inch....	\$1.25
From 10-inch to 14-inch	\$1.50
From 16-inch or over	\$1.75 to \$2.00

For each additional patch not over 2-inch, each, 25c.

Valve Base Vulcanized in Tube, 75c.

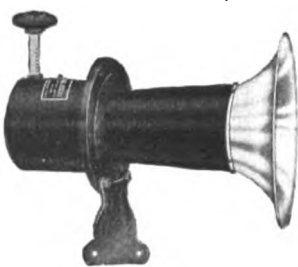
Metal Valve Inserted, small, 50c, to large, 75c.

10 Per Cent. Discount On All Work Done Before April 1st

FREIGHT OR EXPRESS CHARGES PAID ON ALL OUT OF TOWN WORK



WEED TIRE CHAIN



KLAXON HAND HORN



LEAK-PROOF PISTON RING

Distributor for Western and Central Massachusetts, New Hampshire and Vermont for all Standard Lines of Motor Car Accessories

We carry at all times one of the best assortments of Accessories for the car and apparel for the motorist offered by any house in New England. Tools, Oils, Greases, Tires, Chains, Reliners, Lamps, Horns, Carburetors, Windshields, Presto Tanks, Jacks, Tire Holders, Leak-proof Piston Rings, Electric Lamp Bulbs, Metal Tool Boxes, Tire Chains, Speedometers, Fur Coats, Rain Coats, Robes, Gloves, Goggles—in fact everything that the auto or autoist requires.

ALSTEN & GOULDING CO.

WORCESTER, MASS.

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Automobile
Motorcycle
& Bicycle
Accessories

Supplies
& Parts

Goodby-Rankin Co.

57 WASHINGTON ST.,
PROVIDENCE RHODE ISLAND.

ANNOUNCEMENT

**We are the largest distributors of
Automobile Tires and Tubes in New England**

**Our stock is fresh and
we have no leftovers**

**Everything You Need for the
Motor Car or Truck**

Depot for—

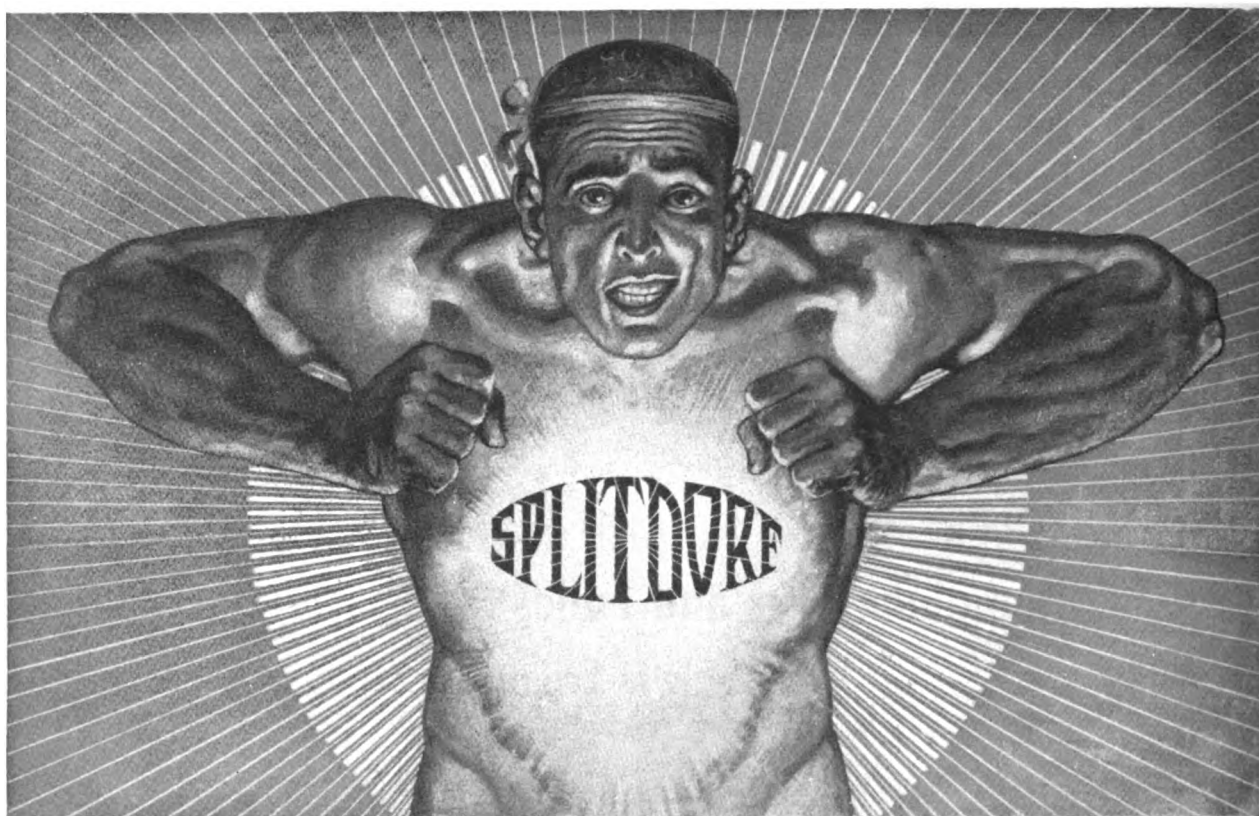
**Firestone—Federal
G. & J.—United States
Lee Puncture Proof—Michelin**

CASES AND TUBES

**Firestone Motor Truck tires, all sizes, in stock
Distributor for OILZUM oils and greases**

WHOLESALE

RETAIL



For Low-Powered High-Speed Engines

there is nothing on the market so effective as the new waterproof, high-tension SPLITDORF "E U 4" MAGNETO. In design and construction it is destined to fill a long felt want in the motoring world as low-powered, high-speed machines can now be equipped with a powerful instrument to give their ignition systems the "kick" they have so sadly needed.

Waterproof and dustproof, the "E U 4" SPLITDORF magneto is made throughout on a principle of strict utility combined with natty appearance and reserve power sufficient for a 30 horsepower motor at high speed.

It is a simple instrument, simple in wiring and easily installed to produce the hottest of hot, fat sparks and guaranteed to give the small high-speed engines a flexible ignition system and a world of reliable "pick-up" power never before attained.

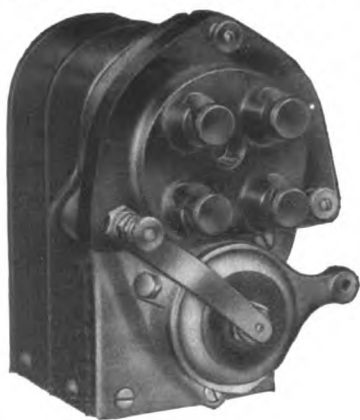
Full information upon request

SPLITDORF ELECTRICAL CO.

ATLANTA, 10-12 E. Harris St.
BOSTON, 180-182 Massachusetts Ave.
CHICAGO, 64-72 E. 14th St.
DETROIT, 972 Woodward Ave.
KANSAS CITY, 1823 Grand Ave.
LOS ANGELES, 1226 S. Olive St.

NEWARK, 290 Halsey St.
NEW YORK, 18-20 West 63rd St.
PHILADELPHIA, 210-12 N. 13th St.
SAN FRANCISCO, 1028 Geary St.
SEATTLE, 1628 Broadway.
LONDON BUENOS AIRES

Factory: NEWARK, NEW JERSEY



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Mosler

Vesuvius

Plugs

Insist

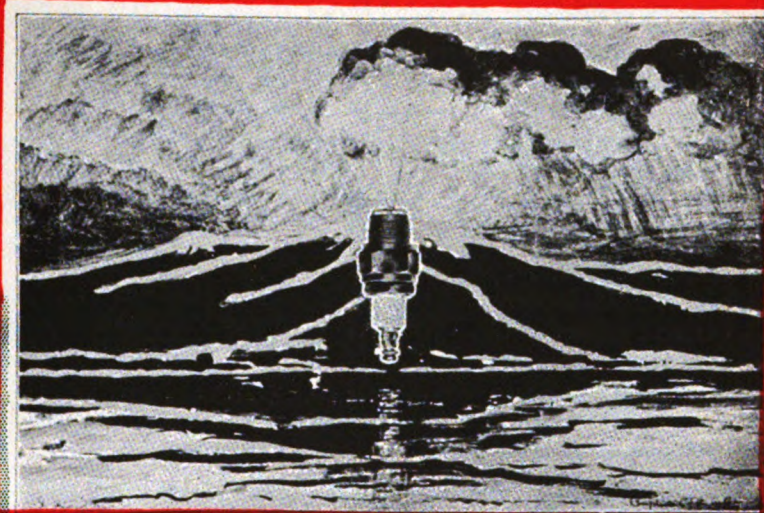
Upon

Mosler

Spit Fire

RED TAG

Plugs



AS POWERFUL AND AS INDESTRUCTIBLE AS THE FIRE OF VESUVIUS



PACKED IN THIS BOX
& TAGGED
FOR YOUR PROTECTION

IT

GUARANTEES

Genuine Platinum Point

Energetic Ignition

Greater Power

**WE CARRY IN STOCK A PLUG FOR EVERY
INTERNAL COMBUSTION ENGINE BUILT.**

SOLD BY THE LEADING DEALERS

A.R. MOSLER & CO., MT. VERNON, N.Y.

003



Absolutely Gas Tight

Has No Equal

For Speed and Power

Can Be Taken Apart Easily

And Reassembled

Absolutely Gas Tight

The Stone-Insulated Plug

Par Excellence

Will Outlast Your Motor

Made to fit any Engine,

any Thread

A.R. MOSLER & CO.,

MT. VERNON, N.Y.

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SELL! SELL! SELL!

The MARCH ISSUE of the
ACCESSORY and GARAGE JOURNAL

Will Be Read By

15,000

TRADE INTERESTS

No Owners

All Trade

SERVICE AND DISTRIBUTION GUARANTEED

The *multiple* point spark plug is superior to the single point plug!

The continual sparking between two points, on cars equipped with a magneto, has a tendency to so widen the gap that finally the spark cannot jump across—and a single point plug fails to spark.

With the multiple point plug, under such conditions, another point immediately takes up the spark—with no loss of power.

This is but one of the reasons why
everyone should use

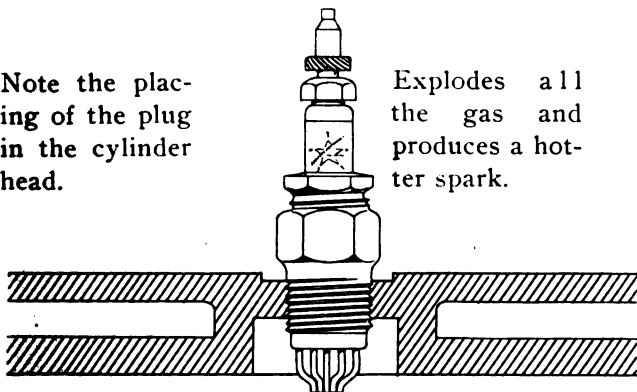
BETHLEHEM ^{FIVE POINT} SPARK PLUGS

No leakage in compression possible—because of patented gasket construction.

No priming plugs necessary because the long points deliver the spark directly into the gas, starting the car easily and quickly.

Bethlehem plugs have been *proven* to develop more power on less fuel consumption.

Note the placing of the plug in the cylinder head.



Explodes all the gas and produces a hotter spark.

It is economy to buy Bethlehem.

Types for all engines.

Three sizes—metric, ½ inch, ⅞ inch (also made in motorcycle type with both mica and mica-porcelain insulation).

All dealers, \$1.25 each, or by mail on receipt of price.
Booklet Free.

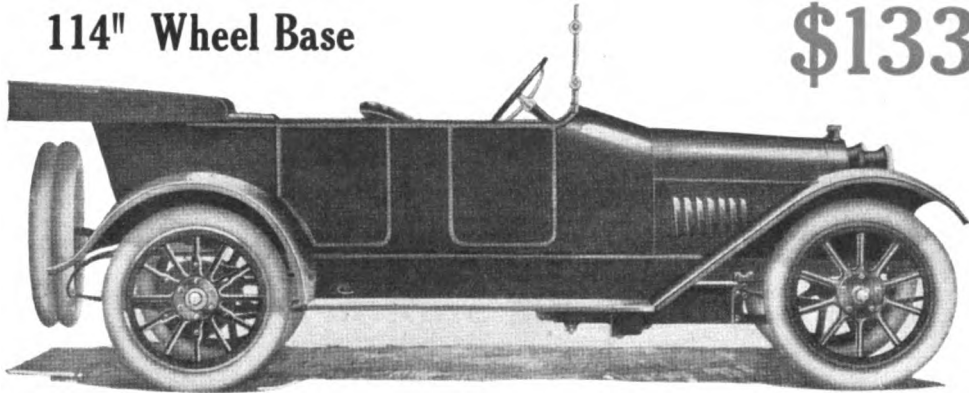
THE SILVEX COMPANY
SIXTY WALL STREET, NEW YORK CITY

Lexington

114" Wheel Base

4 Cylinder
Fully Equipped

\$1335



Your Success—And Ours

There is a great similarity between men and motor cars; each possesses characteristics that make them desirable or unfit.

When you set out to find a man to work for you, you don't hire the most flashily dressed man you meet; neither do you hire the fellow who talks the most.

You look rather to what that man has to offer you for the money you plan to lay down for his salary.

If you choose such a man, because of his good appearance and find that under that resplendent appearance there is nothing to back it up: what do you do?

And if you are impressed by his fluent conversation and discover that his entire brain is in

his mouth; chances are ten to one you stop his pay check.

There is a great similarity between men and motor cars.

Many a car has found favor through its paint job; in fact a good finishing department is the salvation of poor construction; for a time.

Many an advertising man has gained a dealer's confidence by his assumed sincerity in the product he was selling.

But as with men, motor cars must deserve such trust in order to hold the ground thus gained.

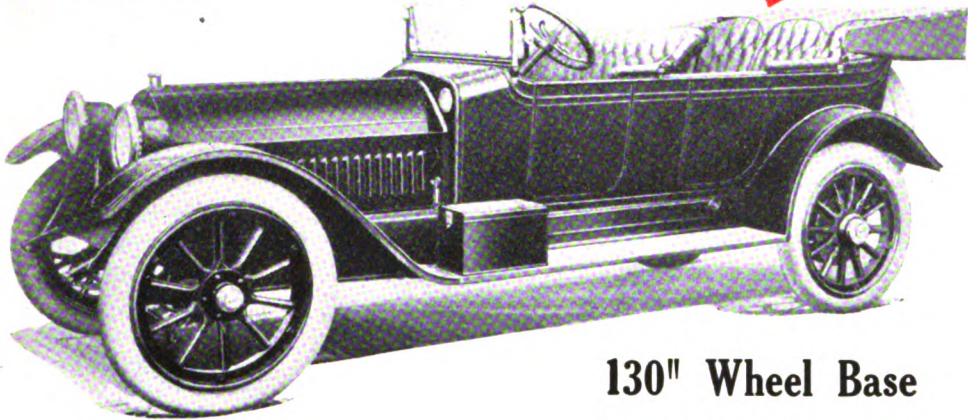
There is a law in human affairs that rewards the fit against the unfit; that sends the deserving up the success ladder with exactly the same speed as it tumbles the unworthy down.

THE LEXINGTON-

131 Main Street,

6 Cylinder
Fully Equipped
\$2375

HOWARD



130" Wheel Base

Your Profits—And Ours

Now the point behind all this is that you, as a motor car dealer, must be very sure of your ground before you enter into a binding contract with anybody.

We want to put before you in very simple terms, the high character of the Lexington-Howard organization; its methods; its value to you.

Then we want you to judge us, our sincerity, our responsibility; solely upon your own knowledge of human nature.

First of all the Lexington-Howard is an organization of specialists; men who have spent their lives in perfecting themselves in their individual lines.

These men have proved their experience in profit paying plants before they entered ours.

We don't want you to take our word for this; we want you to make us prove it.

What you are most concerned with is our method of manufacture and the provision we have made for our permanency in the automobile business.

The Lexington-Howard plant has been most carefully and profitably departmentized.

Each part of the car represents a unit of manufacture; each unit is working every day at a profit.

The fact that we have made so liberal a provision for our dealers is only good business.

Unless you as a dealer receive the proper share of profits you will not remain in business; and it is upon you and you alone that our future as motor car manufacturers must rest.

Then if you will ask us for our sales proposition you will receive another very pleasant surprise; because it's your interest that's at the bottom of this whole affair.

We have laid our plans along lines that mean your success and ours; which, of course, means your profit and ours.

Don't be satisfied with merely reading this announcement. Write today and ask us to tell you just wherein the value of the Lexington-Howard organization lies. We will show you very quickly that there are a great many reasons why you should sell the Lexington "Four" and the Howard "Six" in your city.

HOWARD COMPANY

Connersville, Indiana, U. S. A.

PUBLISHER'S COMMENT.

Since the Boston Automobile Show is the largest of the year, either in this country or abroad, it is particularly fitting that this Annual Advance Boston Show Number of The Automobile Journal should serve the purpose of a reference book of the industry for the 1914 season. This fact has been borne in mind during the preparation of the text matter, but special attention may be drawn to the advertising pages, as supplementing in the fullest degree the presentation of essential facts contained within the body of the magazine. The co-operative efforts of advertiser and publisher have been such as to result in a number which undoubtedly will be highly prized and retained for constant use throughout the coming year.

The Succeeding Issues will be replete with information concerning the greatest of all automobile exhibitions, the Boston Automobile Show, both with respect to the display of passenger vehicles, cyclecars, motorcycles and accessories, March 7-14, and the only commercial vehicle display of national proportions this year, March 17-21. You will need these review numbers. Order

now--direct, or through your news dealer.

Despite the Space devoted in this number to special features of more than ordinary interest, none of the regular departments has been omitted. The section given

over to New Accessories (page 36) appears in each issue, and it is the aim of the publisher to present therein all that is new and of direct, personal interest to the motorist, as designed to make for his comfort and convenience in the use of the car, or economy and efficiency in its maintenance and operation. Two other departments, that containing Suggestions for New Owners (page 33) and that devoted to Correspondence with Reader (page 40) are particularly intended to meet the needs of those who seek practical information upon any problem encountered, and readers of The Automobile Journal are invited to make full use of them.

The Buyers' Guide on pages 85-96, inclusive, is of exceptional value to those who desire to purchase new cars, accessories, supplies and fittings. The concerns listed are wholly reliable and worthy of your consideration in every way.

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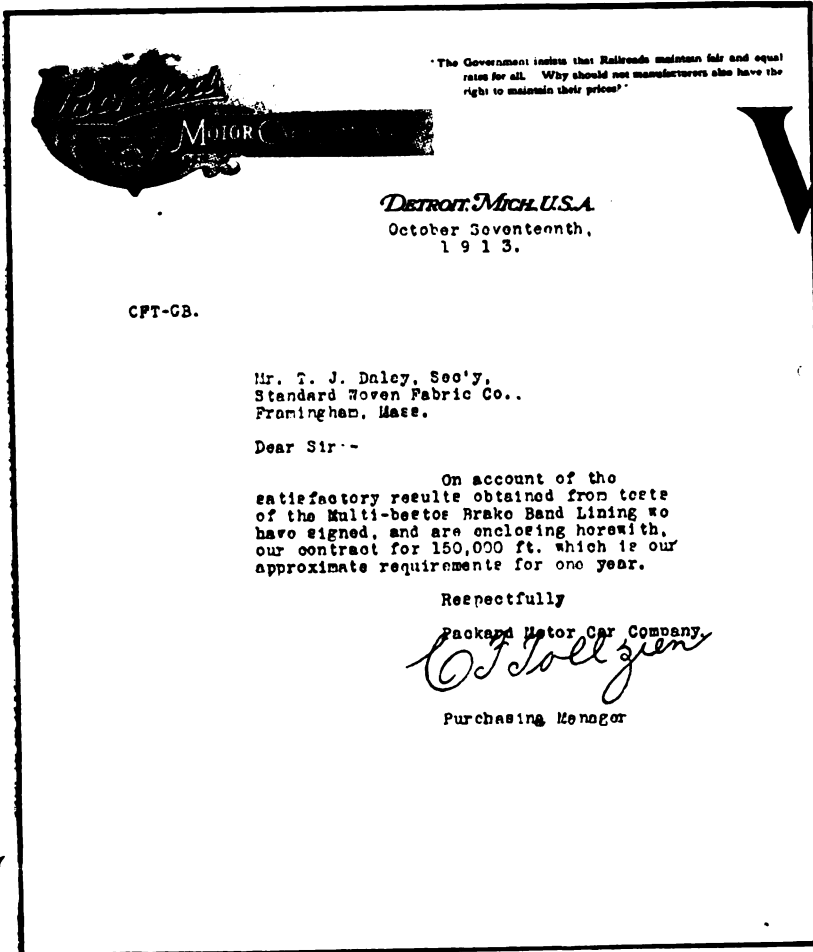
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Why

The Chart shows the results of a series of tests conducted for us at the Worcester Polytechnic Institute to determine the relative superiority of Multibestos over five other leading brake linings.

Just exactly how much superior Multibestos is in various braking qualifications is shown by the chart.

The figures from 0 to 36 represent units of pressure on the brake pedal. Figures from 0 to 100 represent the braking effect on the car wheel.

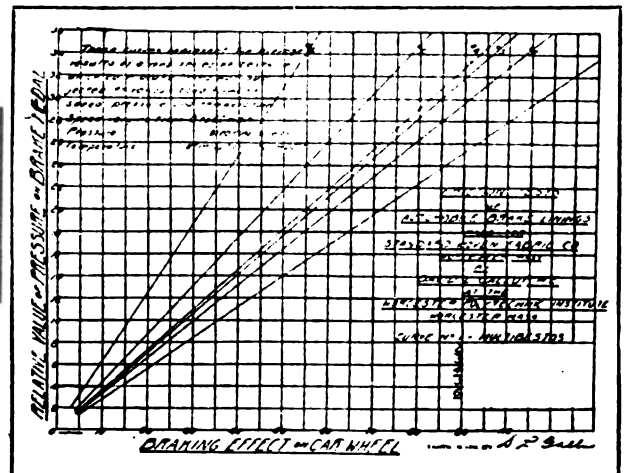
So, taking 16 units pressure, Multibestos shows a braking effect of 57; the other linings from 48 on down to 26, or from 85% down to 45% of the efficiency of Multibestos.

Insure the safety of the cars you sell by seeing that they are Multibestos equipped.



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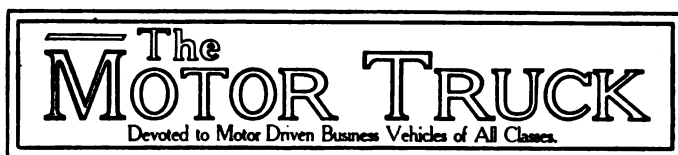
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ONLY NATIONAL DISPLAY



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Advance
March 12

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Suppose Your Lights Failed Suddenly!

You have been in a theatre or at home when the electric lights went out, because something went wrong at the power house. Next time it happens, stop and think!

Suppose you were travelling in an automobile, at 15 or 20 miles an hour, when the light failed without an instant's warning!

Remember that when a light snaps out and pitches you abruptly into darkness, you are blinded for several moments.

What might happen in just these few moments before you could see where you were steering? Suppose you were driving on a slippery road or toward a turn with a steep ditch before you!

Electric light from a power house, generated and cared for by experts, is fairly reliable.

But electric light on the automobile is apt to fail at any moment, and from dozens of causes, and pitch you into—what?

Prest-O-Lite

cannot fail suddenly. There are no delicate connections or "short circuits." Even should your supply of gas run low, the light dies down slowly, giving ample warning and usually with sufficient time to drive to the nearest town or village where you will find Prest-O-Lite exchange service.

Added to this great safety factor of Prest-O-Lite—you will find its light far more efficient for driving at night. The beams show the road *directly in front of the car* and to either side of the road—not concentrated in a dazzling ray of light on some church steeple a half a mile ahead. There are no tiresome shadows and "rings" of light which tire the eye and confuse the driver.

Prest-O-Lite consumes no engine power, and is operated at one-third to one-fifth the cost of electric light. It breeds no troubles and needs no expert attention.

EXPERIENCE!

"Our car was equipped with what we know to be as good an electric lighting plant as the market affords. Yet we were constantly in trouble. First one light and then the other, or perhaps both would suddenly go out without any apparent cause, and this usually happened when the car was most needed."

"Aside from the inconvenience, the repairs and replacements made it a very expensive lighting system to operate."

"As a solution to troubles, we decided to install Prest-O-Lite and since this has been done we are pleased to say that we now have a light that not only is inexpensive, but is absolutely reliable, and can now enjoy an evening's ride without the constant fear of being suddenly thrown into darkness."

(Name on Request)

You get all the convenience of "push-the-button" operation with the Prest-O-Lite, which lights and extinguishes gas lamps from the dash.

Get This Information!

By all means, whether you own a car or are considering buying one, get this complete information on ALL Systems of Lighting. It gives the results of actual experience. It produces actual **proof** for every assertion we make. It will save you time, money and trouble. It is yours for the asking. Use the coupon—

The Prest-O-Lite Co., Inc.

226 Speedway, Indianapolis, Ind.

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**The Prest-O-Lite
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226 Speedway, Indianapolis, Ind.

Send facts on ALL
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A VISION

**of your car,
dangerously skidding
on the slippery
pavement ahead——**

You have neglected to put on Weed Chains.

You anxiously view the slippery pavement ahead, and have *a mental picture* of your car "side-swiping" a fellow motorist.

Why nurse anxiety and coax calamity — why take such chances when you know

Weed Anti-Skid Chains

Absolutely Prevent Skidding

If you don't equip your car with Weed Chains, and put them on when the roads are slippery and muddy or covered with snow and ice, you are taking chances on your own life and are a serious menace to every road user.

Weed Chains *do not injure tires* even as much as one little slip or skid—They are slipped on in a minute without a jack—*they never fail* in an emergency. Join the *safety campaign*—exercise caution. *Equip your car with Weed Chains today.*

Sold for ALL Tires by Dealers Everywhere

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28 Moore Street New York

Manufactured for Canada by

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THE AUTOMOBILE JOURNAL

VOL. XXXVII, No. 2

FEBRUARY 25, 1914

Price, \$1.00 the Year

AMERICA'S LARGEST CO-OPERATIVE GARAGE.

Splendidly Appointed Structure Recently Occupied by Massachusetts Automobile Club in Boston---Detailed Description of Various Departments and Methods Employed to Provide for Comfort and Convenience of Membership.

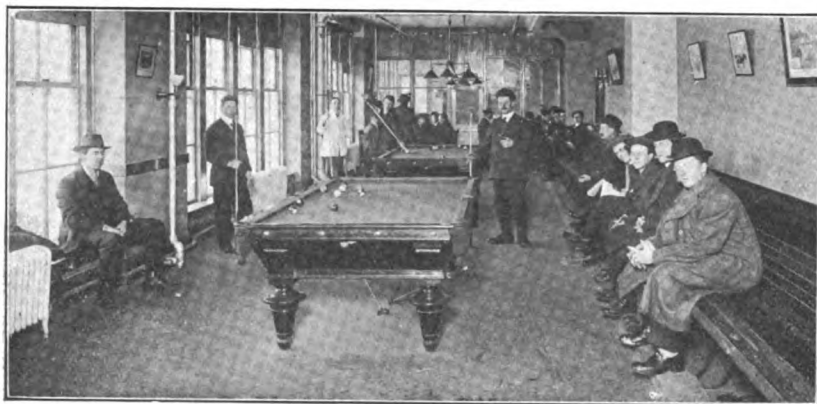
THE Massachusetts Automobile Club, Boston, Mass., occupies a unique position in the industry, from the fact that it was the first organization of this character in America to operate a garage on the co-operative principle. At the time, 1902, there were very few garages of any description in this country, and the industry as such was only just beginning to take on the aspects of a commercial reality. Last month the club took possession of its handsome new clubhouse and garage at Stuart and Clarendon streets, just off St. James avenue—the large-

est and most completely equipped institution of its kind in America, if not in the world.

J. Ransom Bridge, Conrad J. Rueter, L. E. Knott, Eleazer Cate, Wilbert E. Bartlett, John Brisbane Walker, Jr., Ernest L. Rueter and William A. Rolfe organized the Massachusetts Automobile Club Oct. 29, 1900. Jan. 11, 1901, the Automobile Club of New England was formed. These two were consolidated, under the former name, Nov. 4, 1901. Work appears to have been begun almost immediately thereafter on the clubhouse and garage on Boylston



Handsome New Clubhouse and Garage of the Massachusetts Automobile Club, Boston—Largest Building of This Character in the Country.



Recreation Room, at Disposal of Chauffeurs During Their Waiting Periods.

street. The club has been located on Boylston street continuously since that time, until the completion of the building illustrated and described herein.

Description of the Building.

The structure comprises seven stories and basement, and the construction is of brick and concrete throughout. Every precaution has been taken to provide fireproof qualities, and to this end a most up-to-date sprinkler system has been installed, this virtually being two systems in one, since one-half of the building is served by one set of sprinklers and the other half by another. All doors leading into the elevator shafts are arranged to operate automatically in connection with the sprinklers, and by this means it is possible to completely shut off each of the garage floors, for instance, from all other portions of the building. There is no exposed wood work, except in the offices, reception rooms, etc. It is believed that the building is in every way as nearly fireproof as it is possible to make it.



Reception Room, Occupying a Large Portion of the Stuart Street Front, Second Floor, with Directors' Room and Kitchen in the Distance.

Storage space is provided on six floors, and the main portion of the basement is given over to dead storage, so that it is possible to house some 350 cars. Each of these floors is arranged exactly the same, and the system evolved for the movement of cars, on the floors and upon entering and leaving the building, is most interesting and exceedingly practical.

With the exception of first, second and third floors, where there are but three rows of stalls, there is provision for two rows of machines down the centre and one on either side, an open space being reserved between the cars in the



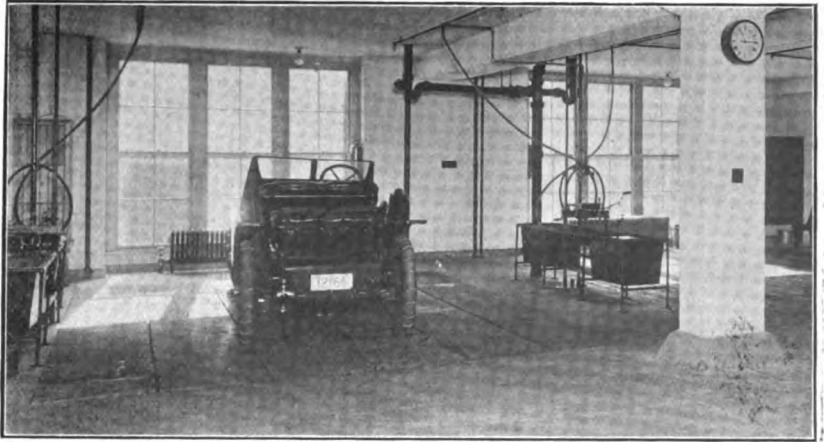
One Corner of the General Offices, Second Floor.

middle of the floor and those at the side. Electric elevators communicate with all floors. There are three of these, one reserved for incoming cars and two for outgoing. The reason for this arrangement is found in the fact that the congestion is most noticeable among machines leaving the building. There are hours, those immediately preceding a large reception or the opera, for example, when this congestion is decidedly marked. At times it becomes necessary to use all three elevators for outgoing cars.

Machines enter the building at the door nearest the Clarendon street corner (that shown at the

right in the accompany illustration), and proceed down the aisle on that side to the incoming elevator at the rear, providing, of course, they are not stationed on the first floor. Upon reaching the proper floor the car is backed off the elevator and run to the left, around the stalls in the centre, until it reaches its own space.

In leaving the building the car proceeds around the open space or aisle, always moving toward the left, backs onto one of the outgoing elevators, in which position it is ready to be driven directly out the front door (that shown at the left) upon reaching the street floor. Thus it will be seen that cars always are moving in one direction and the possibility of confusion



Well Lighted Double Washstands Are Provided on Each of Garage Floors.



Work Bench for Minor Jobs in Centre of Repair Shop.

in this respect is thereby reduced to a minimum.

Each floor is in charge of a man whose duty it is to signal for the elevator, whenever it is desired to take the car out, as well as to superintend the movement of the cars on his floor for washing, etc. Between the elevator wells is a double washstand, equipped with every facility for thoroughly cleansing the cars, this including vacuum cleaners for the upholstery, etc., and compressed air for tire inflation. Except when entering or leaving the building machines are never operated under their own power.

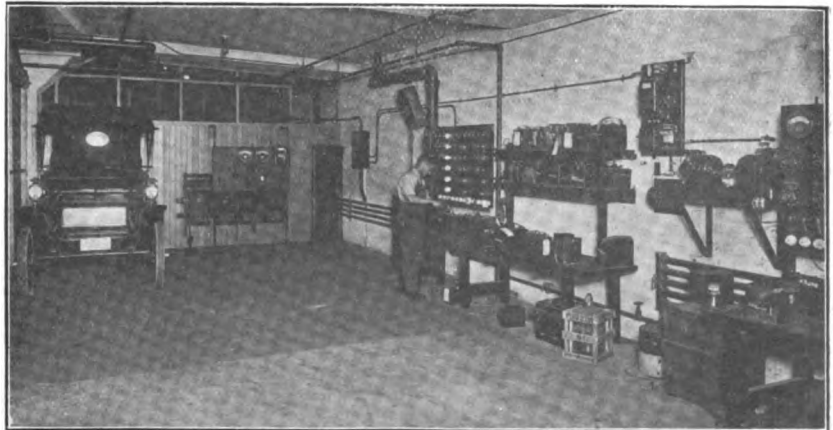
Directly in front of the washstand is a telephone booth, by means of which it is possible to

communicate with the switchboard, etc. In case the chauffeur is not in the building when his employer calls, and it is desired to leave special instructions for him, these are posted on a bulletin board at the side of the telephone booth on the floor on which the car is located.

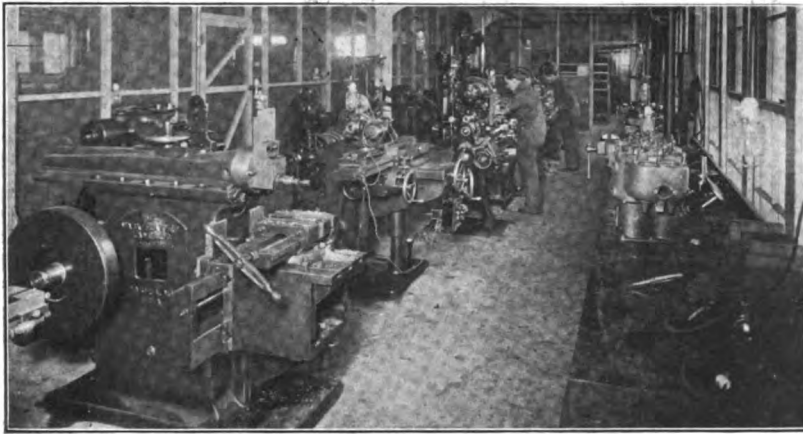
Recording Entrance and Exit.

On the first floor, along the Clarendon street side, are: First, the superintendent's office and switchboard; then, the stairway leading to the general offices and reception room, etc.; next, the ladies' room, and behind that the stockrooms, and at the extreme rear, the entrance for chauffeurs and employees. H. V. Chamberlain is superintendent and C. A. Edwards his assistant.

The doors for the entrance and egress of cars are operated by individual electric motors. In order to comply with the statutes of Massachusetts with regard to recording the arrival and departure of all cars from a garage, attendants are located in small booths just inside these doors. These men not only take note of the car num-



The Electrical Room Is on the Seventh Floor, Adjoining the Repair Shop, and Is Equipped to Handle All Necessary Battery Work.



The Equipment in the Machine Shop Is Complete in Every Detail—Toolroom at the Rear.

bers in accordance with the legal requirement, these being recorded on daily loose leaf sheets, but advantage is taken of their presence to add another interesting feature in connection with the service rendered to club members.

Keep Track of Chauffeurs.

Each chauffeur is given a number, and, since there is provision for 300 cars on regular storage, exclusive of those on dead storage, a board is placed over the telephone switchboard, which carries 300 numbers. Whenever a car approaches the entrance, it is reflected in a mirror hanging in the proper position, and the operator at the door depresses a lever which connects the electric motor with a set of spring releases in such manner as to cause the door to slide open. As the car enters the building the registration number is noted and checked on the daily sheet. At the same time a button is pressed, which causes a black disc over the chauffeur's number on the board above mentioned to expose the number,

signifying that that chauffeur is in the building. A similar plan is followed with reference to cars leaving the building, with the exception that the black disc falls into place over the chauffeur's number, indicating that he is not in the building. In case the chauffeur does not go out with the car, but uses the rear entrance, another operator at that point transmits this information by pressing buttons at that door. The advantage of the system lies in the fact that the telephone operator is able at all times to inform the employer whether or not the chauffeur is in the building.

In the stockrooms are to be found such accessories and supplies as are likely to be needed. These are in charge of the superintendent or his assistant and cannot be secured without his knowledge. The rooms given over to lubricants and gasoline are provided with every facility for readily handling these supplies. In the basement, runways and adjustable tracks make it an easy matter to roll a barrel of oil or gasoline into place, and from these self-measuring pumps extend into the rooms above.

Handsome Reception Room.

The entire Stuart street front of the second floor is given over to the reception room, directors' room and kitchen. These are handsomely appointed and contain every convenience for serving lunches, etc. It is purposed to add a library and other comforts for entertaining visitors from other cities. This is part of a plan now under consideration, by which special cour-



General View of One of the Garage Floors, All of Which Are Arranged Practically Alike, with Open Space Be-

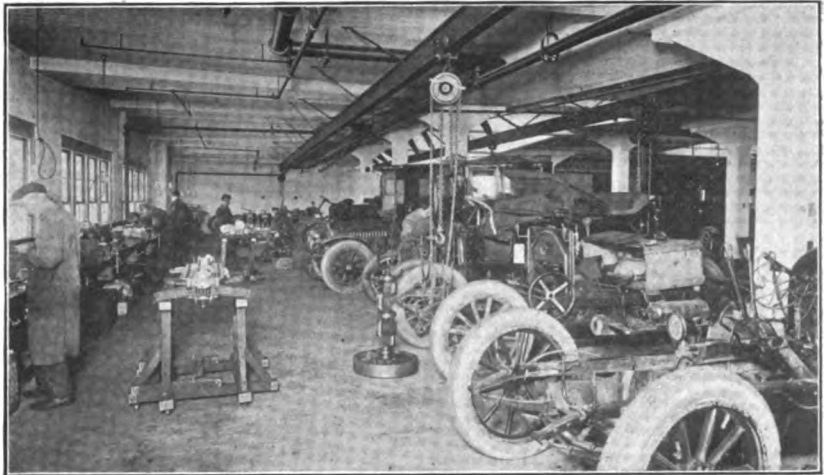
tesies will be exchanged between members of this club and the Automobile Club of America in New York City and the Automobile Club of Philadelphia. Along the Clarendon street side are the general offices of the club, in which are the filing cabinets for members' accounts, etc. All these rooms are finished in mahogany and the furniture and decorations are strictly in keeping with the uses for which they are intended.

On the third floor, above the general offices, is the chauffeurs' room. This is really two rooms in one. The entrance is from the rear of the building, and directly into the main waiting room, which is equipped with billiard and pool tables, and provisions for other games. Separated by a glass partition is the reading room, where all the latest technical, trade and current literature is available.

The Repair Shop Floor.

The top floor is given over entirely to the repair shop, and a factor of decided prominence is the abundance of light available. The elevators also communicate with this floor. Between the wells, in the space occupied on the other floors by the washstands, chauffeurs are permitted to work on their own cars. In front of this space is the entrance to the office, in charge of V. J. Oglivie as foreman and J. Brandy as assistant.

Along the north side—the Stuart street front—is the work bench, an arrangement which not only affords a maximum of light, but one which is designed to take advantage of the light from

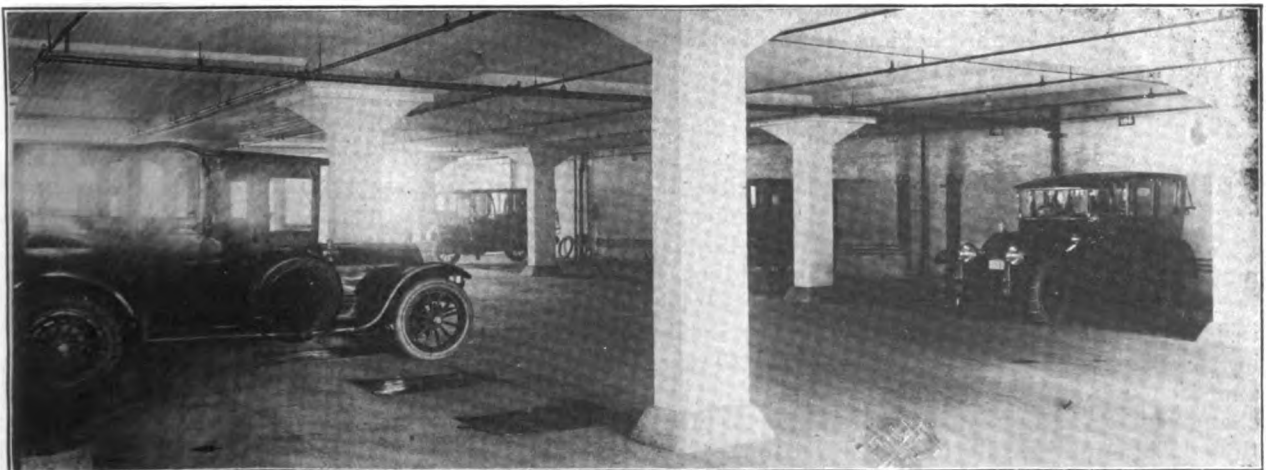


Looking Down the Aisle Between the Work Bench and Trolley Hoists in the Repair Shop.

the north, which is considered the most constant. Directly behind this is a double trolley hoist, by means of which it is possible to pick up either end, or both, of the chassis at will, take out a motor, etc., without disturbing the relative position of the chassis. Every necessary tool is provided. This applies as well to the work bench for smaller repairs through the centre of the room, directly under an ample skylight.

Machine Shop Equipment.

The machine shop is set off from the main portion of the room, on the Clarendon street side, by a wire netting partition, and the equipment of this department includes a number of machine tools which are not usually to be found outside the automobile factories. Mr. Oglivie maintains that he is able to undertake any piece of work which is likely to be presented. This is a desirable factor, since many of the cars stored in the



Between the Rows of Stalls, in Which Cars Are Required Always to Move in the Same Direction to Avoid Confusion.

garage are of foreign manufacture, for which spare parts may not be secured readily.

Back of this is the tool room, presided over by one of the men in the machine shop. Each workman is supplied with 10 brass checks, bearing an individual number. Whenever he desires a special tool he exchanges one of these checks therefor, and as soon as it is returned he receives his check in exchange. In this manner it is possible at all times to account for the entire tool equipment.

Chauffeurs May Work on Cars.

It may be added that chauffeurs who desire to work on their own cars in the space provided for that purpose, may also acquire the use of these tools. A given number of checks, similar to those used by the employees of the club, but slightly different in shape, are sold for a stated price, the service thus contracted for to be taken advantage of within a certain time. These checks are exchanged for tools in exactly the same manner as has been described with reference to the workmen.

On the other side of the building, beginning at the front, are the blacksmith shop, the storage space for tires and inner tubes, and the electric charging room, in the order named. The electrical equipment is complete in every particular for charging, repairing batteries, etc., and is in charge of a competent battery expert.

Nothing has been left undone in an effort to provide every comfort and convenience for the club member and his chauffeur. In addition, the club seeks to afford all necessary service, so far as this may be at all practicable, on a co-operative basis, and as nearly as possible at cost. It is maintained that in no sense is the institution a money making venture.

Property Held by Trust.

The property is now held by the Massachusetts Automobile Club Trust, a realty trust organized for this purpose. During the life of the club in its location on Boylston street, a considerable fund was accumulated from initiation fees, annual dues, etc., and this was materially increased, of course, by the sale of that property. It was, however, necessary to secure additional money for the erection of the present building.

As devised, the plan was as follows: Each resident member was presented with five shares in the Massachusetts Automobile Club Trust, and each non-resident member 2.5 shares, in exchange for their interest in the fund above mentioned, and in the sale of the Boylston street property. Each resident member also was permitted to purchase five shares, and each non-res-

ident, 2.5. Additional money was raised by mortgage.

Some stock of the realty trust is still retained in the treasury, and will be issued, one share, par value \$50, to each new member. The trust will continue to hold the property, the Massachusetts Automobile Club paying rental therefor by turning over to the trust all initiation fees and annual dues. For a time, of course, these payments will serve to meet the interest on the mortgage and to reduce the principal. In time, it is anticipated there will be opportunity to declare dividends, but even then, it will be seen that the co-operative feature should be reserved, since the members of the club hold the stock in the trust, and it is provided that whenever such stock is for sale it shall first be offered to the directors of the club.

Policy of the Club.

In the early days of the industry, the Massachusetts Automobile Club promoted a number of events calculated to encourage experimentation and development. Thus, for instance, before the formation of the Boston Automobile Dealers' Association, the Boston automobile show of 1902 was held under the club's auspices. In recent years, however, the entire activities of the organization have been directed wholly toward providing for the needs of its members along the lines indicated herein, and this policy will be continued in the new building.

The present officers of the club are: President, William H. Ames; first vice president, Bancroft C. Davis; second vice president, William A. Rolfe; treasurer, Frank W. Remick, and secretary, Arthur Brooks.

ELEVEN ENTRIES NOW.

Numbers Are Drawn by Cars Listed for the 500-Mile Race at Indianapolis.

The management of the Indianapolis motor speedway, on which the fourth 500-mile race for the International Sweepstakes trophy will be held Memorial Day, announces that 11 cars have been entered for this event. This does not include the two Maxwell cars, which are being constructed under the direction of Ray Harroun, who won the first 500-mile race in a Marmon.

Numbers have been assigned to the 11 above mentioned as follows: Burman, Burman, 1; Cooper, Stutz, 2; Anderson, Stutz, 3; Wilcox, Gray Fox, 4; Keene, Bullet, 5; Goux, Peugeot, 6; Boillot, Peugeot, 7; Chassagne, Sunbeam, 9; Guyot, Delage, 10; Christiaens, Excelsior, 12; ———, Burman, 17.

ENGINE MAKERS' MEETING.**New Association Discusses Conditions Affecting Business of Members.**

The organization of the Automobile Engine Manufacturers' Association was noted in these columns recently. At the last meeting it was announced that about 60 per cent. of the makers in the industry was represented in the membership and that the output of these manufacturers was about 85 per cent. of the total.

One of the questions discussed at some length was the lack of results obtained from motor shows, and practically all present agreed that the returns did not warrant the time and expense incurred in making display. A canvass among all motor manufacturers was inaugurated to determine whether or not such exhibition should be eliminated hereafter.

It also was decided to make all contracts as strong and binding as possible. The matter of losses through deferring of contract shipments was discussed, and it was purposed to regulate this condition by adopting charges which would prove remunerative. Credits will be gone into thoroughly, and it was purposed to prosecute all defalcations, and attempts at imposition will be safeguarded by making them public, so far as possible.

The next meeting will be held in Chicago, March 20. The office of the new organization has been established at 603-608 Monadnock building, Chicago, with M. Wulpi in charge as commissioner.

SECOND PITTSBURG DISPLAY.**Fourth Annual Exhibition of the Pittsburgh Auto Show Association Most Successful.**

The fourth annual exhibition of the Pittsburgh Auto Show Association, under the management of J. H. Zimmerman, was held in Exposition hall, Pittsburgh, Penn., Feb. 14-21, this being the second display of automobiles and accessories for that city this year. The event was a decided success, new records in number of exhibits, attendance and sales being established.

The main floor of the hall, which is the largest single room in the city, free from pillars or

obstructions of any nature, was completely filled with cars and trucks. Particular attention was directed to the latter, because of the exceptional interest which has been manifested in this type of vehicle in Pittsburg during the past few months. The cyclecar also was a decided attraction and many sales were recorded during the week.

SALES POLICY CONVENTION.**Splitdorf and Apple Executive and Branch House Heads Gather in Dayton.**

With the recent reorganization of the Apple Electric Company of Dayton, O., through the financial and active support of the Splitdorf Electrical Company, Newark, N. J., the selling and distributing of the products of the Dayton con-



Representatives of Apple Electric and Splitdorf Electrical Companies in Convention at Dayton, O.

cern will, in the future, be conducted through the branch houses of the Splitdorf company. At a recent sales policy meeting of the executive and branch heads of both concerns, held in Dayton, plans in connection with this arrangement were discussed fully. The following were present:

F. A. Cornell, business manager; C. P. Brockway, sales engineer; R. S. Allen, European representative; H. E. Berger, engineering department; C. F. Succop, sales department; R. H. Croninger, factory manager; V. A. Apple, president, and H. F. Apple, sales department of the Apple Electric Company.

H. J. Hinley, manager of branches in Detroit, Dayton and Cincinnati; E. A. Kelley, manager of Chicago, Kansas City, Dallas and Minneapolis branches; R. S. Preble, president of Boston and Chicago branches; O. J. Rohde, treasurer and manager of New York City, Newark, Philadelphia, Atlanta and Toronto branches; F. A. Storer, president, Buenos Aires branch; E. A. Bracket, engineering department; D. R. Walls, advertising manager; C. W. Curtiss, general manager, and W. J. Murray, assistant general manager, represented the Splitdorf Electrical Company.

INCORPORATE MOTOKART COMPANY.**Tarrytown Motor Car Company Finds a Way to Avoid Provision of New York Law.**

Some time ago, when the maker of the Motokart, a four-wheel parcel delivery wagon, sought to incorporate under the laws of New York, it found it could not use the word Motokart. Accordingly, the concern was incorporated as the Tarrytown Motor Car Company. The factory is located in Tarrytown, N. Y., and the general offices in New York City.

It is now announced that papers have been filed in Trenton, N. J., covering the incorporation of the Motokart Company, which is destined to take over the Tarrytown Motor Car Company and the Steinbock Engineering Company. The last named concern has been furnishing the engines and other mechanical units for the Moto-

The event was held in the Auditorium, under the auspices of the motor car dealers' division of the Memphis Business Men's Club. Twenty dealers in cars and an equal number of accessory concerns were represented.

RAYFIELD CARBURETOR CONVENTION.**Salesmen and Dealers Discuss Methods and Policies at Chicago Factory.**

Recently, the Findeisen & Kropf Manufacturing Company called a three-day convention of salesmen and dealers handling Rayfield carburetors, made by this concern, at its factory in Chicago. The event was concluded with a banquet at the New Southern hotel, an accompanying illustration presenting the company seated at the table.

The first day of the convention was given over to the constructive elements of the carburetor industry, and a comparison of the Rayfield with other makes. The men were addressed by Walter Findeisen. The second day, those present took up the question of sales methods and advertising plans. Considerable attention was given to promotion, the discussion being opened by E. A. Bates. The third day was given over to the question of distribution, during the consideration of which it was brought out that the Rayfield carburetor



Banquet of Rayfield Salesmen and Dealers in New Southern Hotel, Chicago.

kart. The new company will be capitalized for \$500,000, and plans are under way for a greatly increased production.

MANY SALES AT MEMPHIS.**Southern City Adds Its Evidence as to General Outlook for 1914 Business.**

Soon after the doors were opened on the fourth annual show of the dealers in Memphis, Tenn., Feb. 16, a six-cylinder Packard car was sold, and this sale was followed almost immediately by the purchase of a Baker electric. Thereafter, business was brisk throughout the week. The attendance was larger than ever before, and the results of the show were such as to completely refute any suggestion that business is not to be good in that portion of the South during 1914.

is sold in practically every city and town in the United States.

The principal address at the banquet was given by H. P. Williams of the advertising firm of Williams & Cunyngnam, who spoke on the subject of "Sales Service".

GLIDDEN TROPHY AWARD.**Somewhat Original and Novel Suggestion as to Disposal of Classic Prizes.**

Although Frank X. Mudd, Chicago, chairman of the touring information board of the American Automobile Association, is said to have under consideration a rather elaborate plan for the disposition of the A. A. A., Glidden and Anderson touring trophies in 1915, when it is proposed to hold a transcontinental tour to the Panama-Pacific exposition in San Francisco,

those in charge of such arrangements for 1914 appear to be very much at sea. It is somewhat well known that the association expects to hold its summer meeting in New England, a special committee, with former President Lewis R. Speare as chairman, having been appointed to have charge of the details.

The Maine Automobile Association has extended an invitation to the national body to unite with it in holding a field day celebration. Similar plans are said to be under way in Massachusetts and Vermont. And in connection with these, it has been suggested that the trophies above mentioned be awarded to those who come to the meeting from the greatest distance in their cars. In order to make this plan possible, with reference to the Glidden trophy, permission will have to be secured from the donor, Charles J. Glidden, to amend the deed of gift, since the trophy was presented to the association as a prize to be awarded in the annual competitive tour.

PLANS FOR FOREIGN TOUR.

Members of Society of Automobile Engineers Will Sail from New York Oct. 10.

The Society of Automobile Engineers has settled upon Oct. 10 as a tentative sailing date for the second European tour. The party will leave New York for Paris, where it is planned to spend at least four days, visiting the plants where Panhard, Renault, De Dion-Bouton, Clement, Peugeot, Delaunay-Belleville and Lemoine cars are produced. Leaving Paris the members will go to Italy, where three days will be spent in Turin and Milan, visiting the Fiat, Isotta, Itala, Lancia, Züst and Bianchi factories.

Lucerne, Switzerland, will be the next stop, with 36 hours of sight-seeing, before proceeding to Schaffhausen to inspect some of the best known electric steel foundries in Europe. Two days will be spent at Stuttgart, Germany, visiting the Mercedes, Daimler, Bosch and Eisemann plants. Then will follow a visit to the Krupp steel works and a trip down the Rhine. In Belgium the Metallurgique and Minerva factories will be inspected.

Although a greater portion of the time during the first foreign tour was spent in England, it is planned to visit that country again, as guests of the Institute of Automobile Engineers, members of which were in America last year. The return will be from Liverpool, arriving in New York about Nov. 18.

MANY AUTOMOBILE BILLS.

Legislatures of Nine States Will Consider a Total of 114 Proposed Laws.

There are nine state legislatures in session at the present time. Six convened during the second week in January and three the third week. In the succeeding five weeks, no less than 30 senate bills and 84 house bills were introduced relating directly to, or affecting directly or indirectly, the use of motor vehicles. These statements are made on the authority of the National Automobile Chamber of Commerce.

Classified by subjects, some of these bills are, in order of their numbers, as follows:

	Senate	House
Fixing registration fees	10	18
Regulating speed and operation.....	4	24
Regulating equipment		11
Lights on all vehicles.....	2	5
Creating highway commissions.....	1	3
Requiring road signs.....		3
State aid for roads.....	1	2
Limiting truck weight and speed.....		2
Licensing all drivers.....		2
Limiting driving age.....	1	1
Requiring wide tires.....	1	1

The nine states and the total number of motor vehicle and road bills introduced in each up to the middle of February are: Massachusetts 44, New Jersey 16, Kentucky 13, Virginia 12, New York 10, South Carolina seven, Maryland six, Rhode Island three and Mississippi three.

Some of the bills are unusually interesting. One requires the payment of \$50 a week for operation of a temporary garage. Another would have all motor vehicles equipped with a device that will scatter 72 metal markers in the street upon striking any object with the front of the car, each marker having stamped upon it the registration number of the machine. The Kentucky senate is asked to prohibit owners of automobiles, doctors and dentists from taking out personal liability insurance. The Virginia house has two bills authorizing Accomac and Spottsylvania counties to levy special licenses on automobiles, in addition to a state registration fee, for the construction of roads in these counties. A Massachusetts bill would make automobile owners fit their cars with headlights or side lights, showing a red light on one side and a green light on the other.

Because of the recent decision of the supreme court in Mississippi that the registration bill enacted in that state was unconstitutional, the legislators have before them a joint bill providing for refunding automobile license fees that were collected before the decision was returned.

BAY STATE AUTOMOBILE ASSOCIATION.

CONDITIONS within the automobile industry have undergone decided change with its increased growth and importance, and methods



L. R. Speare, First President, Bay State Automobile Association.

which at one time were considered efficient have been supplanted by more practical endeavors on the part of those engaged in the manufacture and sale of vehicles and accessories. In the early days, men who had faith in the future possibilities of the horseless carriage were given to forming associations which

had for their main object the encouragement of those engaged in experimental work. This resulted in co-operation between the would-be motorist and those who were to produce that which was to make motoring possible.

That co-operation of this character was desirable cannot be refuted, but it may be contended that with the rapid growth of the business during the past few years, this need for co-operation has been somewhat reversed, and that appears to be the view of the situation which has made its appeal to the Bay State Automobile Association, with headquarters in Boston. This organization has recently inaugurated a new policy, consideration of which undoubtedly will prove of interest.

The Bay State Automobile Association was organized Dec. 1, 1904, its membership being composed very largely of dealers in cars and accessories in Boston. Its first president was Lewis R. Speare, some time later president of the American Automobile Association, with which this body has practically always been affiliated. The reason for its existence was found in the fact that

these dealers felt the need of some such organization to promote automobile contests and other events which would direct special attention to the practicability of the product of what was at that time virtually a new industry.

It would appear, also, that the dealers were interested in the social side of the organization, for, at the first meeting of record, headquarters were established at the Hotel Lenox for six months. The other business of the meeting had to do with the proposition to hold race meets during the summer of 1905, and arranging for a tour to the White mountains.

Association's Early Activities.

Previous to that time race meets had been conducted in the vicinity of Boston by the Country Club of Brookline, June 15, 1901, and the Massachusetts Automobile Club, Readville, June 11, 1904. Two meets were conducted at Readville by this new organization in 1905, one being held Memorial Day and the other, Sept. 9. These appear to have been entirely successful, as the matter of purchasing the Woodlawn Park hotel, in Auburndale, was seriously considered for a time late in 1905.

In 1906 a building on Dartmouth street was leased, and the association became an important factor in the social life of its members. Later, the headquarters were removed to the Hotel Carleton on Boylston street, but eventually the association returned to the Hotel Lenox, where the headquarters have been established for the past several years. Mr. Speare was succeeded as president in 1910 by E. A. Gilmore, who held the of-



Rose Dining Room, Hotel Lenox, Boston, Headquarters of the Bay State Automobile Association.

fice until the beginning of the present year.

Many of the contests conducted by this association were of decided importance to the industry, both as a means of calling attention to motor vehicles in a general way, and as an aid in the perfection of the product. Specific reference may be made to the 100,000 mile non-stop run of 1909. A Maxwell car was the only entrant, and its successful completion of the test established a record which remained unchallenged for a number of years.

New Policy Inaugurated.

But the Bay State Automobile Association feels that the need for this character of activity has passed in a large measure. The practicability of the motor vehicle is now firmly established, and cars may be sold on a strictly merchandise basis.

However, there are other factors to be considered. Dealers and manufacturers are beginning to appreciate that they owe a debt of gratitude for the co-operation extended by the would-be motorists of the early days, and to the owners and users of automobiles since that time.

The Bay State Automobile

Association has decided that the work in mind at the time of organization has been accomplished, and that the time has arrived when it can serve a larger usefulness by co-operating with motorists to the fullest possible degree.

At the recent annual meeting of the association, an entirely new policy was adopted, which is best exemplified by the new motto: "This association stands for fair laws, proper use of the roads and promotion of good fellowship among motorists". These desirable results are considered of importance in the order named.

Boston dealers agree with those of other cities in the opinion that at times owners of cars fail to realize the fullest measure of satisfaction from their use because of the serious handicaps which have been imposed by legislative enact-

ment, and that there is danger of additional restrictions, unless those connected with the industry take steps to protect their interests. A legislative committee will be appointed to have this matter directly in charge.

The proper use of the roads means a careful consideration of the rights of others. The great majority of motorists have suffered quite as much from the lack of consideration on the part of reckless drivers as other users of the highway. It is realized that measures must be adopted to curtail this danger, but it is contended that in many instances those who have sought to be careful have suffered in the unwise administration of existing laws. This association will undertake to employ counsel in an effort to see that automobile owners and users are fully protected in their rights under these laws.

In order to promote good fellowship among motorists, and to place itself in a better position to accomplish the other classes of service contemplated, the Bay State Automobile Association invites owners and dealers throughout the state to become members. Headquarters will remain in the Hotel Lenox, where the use of three rooms is reserved to members, both resi-



J. J. McNamara, Vice President.



**W. H. Stevens, Present President,
Bay State Automobile Association.**



Fred K. Swett, Secretary-Treasurer.

dent and non-resident. One of these is devoted largely to the executive work of the association; the second, to social recreation, and the third, is the handsome Rose dining room, where members and their friends are invited to make themselves at home during business hours, and where the monthly entertainments and annual banquets will be held.

Since the annual meeting the membership has been increased very materially, this being composed of both owners and dealers in Boston and from a number of other cities throughout the

state. The plans are not wholly completed as yet, but with dealers and motorists co-operating to the fullest extent with respect to the matters outlined, it is certain that the industry cannot help but be benefited in every way. Other activities will be inaugurated as rapidly as their need appears to exist.

The officers of the Bay State Automobile Association for the ensuing year are as follows: President, W. H. Stevens; vice president, J. J. McNamara; secretary and treasurer, Fred K. Swett; directors, E. A. Gilmore, R. R. Ross, Dr. H. R. Boyd, Chase Langmaid, Joseph Donovan.

MERCER WINS THE FIFTH GRAND PRIZE.

FORTY miles ahead of the nearest competitor, Edwin Pullen drove his Mercer car, made by the Mercer Automobile Company, Trenton, N. J., across the finish line a winner in the fifth race for the Grand Prize at Santa Monica, Cal., Feb. 28, and for the first time in the history of the event, the award went to an American car. Not only that, but Pullen and his Mercer secured a new record for the event, covering the 403.248 miles in 5:13:00, or at an average speed of 77.29 miles an hour. The previous record was held at 74.07, by the late David L. Bruce-Brown in a Fiat, made during the third race for the Grand Prize at Savannah, Ga., in 1911.

Two days before Pullen and this Mercer took part in the ninth race for the Vanderbilt Cup, and during the 14th lap his machine left the course, while going at an estimated speed of 85 miles an hour, crashing into an iron barricade. At first it was thought that the car was so badly damaged that Pullen would be unable to compete in the longer event. The splendid result is all the more noteworthy in consequence.

Guy Ball, driving a Marmon, finished in second place, his time being 5:53:23. B. Taylor, in a second hand Alco, for which he is said to have paid \$250, was third, in 6:08:29. Ralph De Palma, twice a winner of the Vanderbilt Cup, was fourth, his time being 6:09:08.

Seventeen cars started, and only four finished. Pullen drove an even race from the start, and refused to be led into the many brushes between those who were seeking new speed records. Wishart in a Mercer held the lead until the 23rd lap, when he gave way to De Palma. At this point Wishart risked his life, and probably his chance of winning the race, by swerving off the course to avoid running down an old soldier, who ran in front of the racing cars.

De Palma was forced to stop in the 30th lap, and J. B. Marquis in a Sunbeam took the lead. Gilbert Anderson in a Stutz was second. Less than two minutes later Marquis attempted to take a turn too abruptly, and his machine was overturned. For a time it appeared that the driver was fatally hurt, but later the surgeons announced that his recovery was certain. This was the first serious accident that has occurred on the Santa Monica course, admittedly the fastest in the world.

On the 35th lap Pullen went into the lead. De Palma lost considerable time at the pits at this point, and at one time it was announced that he had withdrawn from the race. Suddenly, with Pullen only eight laps to go, De Palma re-entered the contest. Anderson withdrew at this point, and thereafter there was no doubt as to the result, insofar as the winner was concerned.

As was true of the Vanderbilt Cup race, two days previous, Bosch ignition and the Boyce Motometer made clean sweeps, being fitted to all cars taking part in the event. Pullen's Mercer was fitted with Palmer-Cord tires. Braender tires also figured in the results, De Palma's Mercedes being thus equipped.

Pullen's prize money was \$3000, plus a Bosch award of \$500; Ball secured \$2000 and a Bosch prize of \$150; Taylor, \$1500 and \$100 from the Bosch Magneto Company, and De Palma added \$1000 to the amount won in the Vanderbilt Cup race, as set forth on the next page.

W. S. Campbell has been appointed advertising manager of the Miller Rubber Company, Akron, O., maker of Miller tires. He has had several years' experience in the advertising field, and was for a time circulation manager of the Iron Trade Review and Daily Iron Trade.

HISTORY REPEATED IN VANDERBILT RACE.

DRIVING the same Mercedes car with which he won the eighth race for the Vanderbilt cup, at Milwaukee, Oct. 2, 1912, Ralph De Palma crossed the finish line in the ninth contest for this award at Santa Monica, Cal., Feb. 26, without once stopping during the 294.035 miles, his time for the distance being 3:53:41. Not only did De Palma thus take the trophy twice in succession, thereby duplicating the performance of Harry F. Grant in an Alco car, but he created a new record for the classic, 75.51 miles an hour, as against 74.07, made by Ralph Mulford in a Lozier in the seventh race at Savannah, Ga., in 1911. The record for the course, 78.5, a world's record made by Teddy Tetzlaff in a Fiat, in the Santa Monica road race of May, 1912, was not endangered.

The history of the eighth race was again repeated, when Barney Oldfield crossed the line a little over a minute behind De Palma. His mount was a Mercer, and Hugh Hughes in a Mercer took second place in the race of 1912. Oldfield's time was 3:55:01, and his speed 75.07 miles an hour. He was forced to stop once, on the 34th lap, to change a wheel.

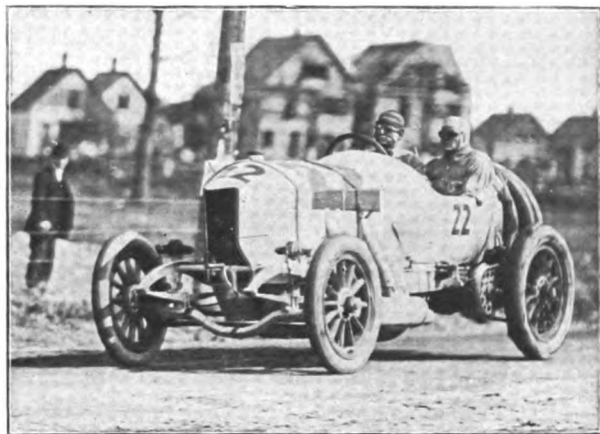
For Spencer E. Wishart in a Mercedes, third place combination in the Milwaukee event, substitute William Carlson, Jr., in the Mason used by Ralph Mulford to create a world's record for 200 miles on a dirt track at Columbus, O., July 4, 1913. The Stutz took fourth place in both events, in 1912 with Gilbert Anderson at the wheel, and at Santa Monica, with Earl Cooper, the hero of the 1913 racing season. George Joerman in a Touraine was fourth this year.

Sixteen cars were entered for the event, and 15 started. Only five finished. Grant in an Isotta, and Lewis in a Mason failed to make the first round. Wishart in a Mercer finished this lap in the lead, closely followed by Anderson in a Stutz and Pullen in a second Mercer. Wishart went out on the third lap. Anderson took the lead in the 14th and held it until the 18th, when he went out. Thereafter it became a race between De Palma and Oldfield for first position.

Besides winning the trophy, De Palma took \$3000 in prize money, Oldfield \$2000, Carlson \$1500 and Cooper \$1000. The Bosch Magneto Company also offered special prizes for place cars fitted with Bosch ignition, and, inasmuch as A. H. Bartsch of that company recently telegraphed East that all cars entered were Bosch equipped, it seems safe to add \$300, \$150 and \$100 to the amounts won by the first, second and third men, respectively.

Braender tires, made by the Braender Rubber & Tire Company, Rutherford, N. J., also figured prominently in the result, since it is conceded that De Palma owed his victory very largely to the fact that he was not obliged to stop once throughout the race. Braender tires were fitted to De Palma's Mercedes, Oldfield's Mercer, Carlson's Mason and Cooper's Stutz.

It will not prove amiss at this time to state that Braender tires first came into prominence in racing circles during the 500-mile event on the Indianapolis speedway last Memorial Day, when Ralph Mulford drove his Mercedes the entire distance without tire change. Later in the season Braender tires assisted Mulford and a Mason car in creating the new world's dirt track record for 200 miles at Columbus, O., without a tire change.



Mercedes Car with Which Ralph De Palma Won Eighth and Ninth Vanderbilt Cup Races.

This same car and the same set of tires went through the two days of racing at Elgin, Ill., in August, finishing in second place the second day, and still later competed in five-mile races on the Galveston beach course, until it is estimated that they went at least 900 miles in contests before being discarded.

Another accessory which occupied a prominent place at the finish was the Boyce Motometer, made by the Motometer Company, 1790 Broadway, New York City. This little device, which is fitted in the filler cap of the radiator and registers the temperature of the cooling fluid, was fitted to all the cars which finished in the Vanderbilt Cup race. Indeed, it is stated by Secretary H. H. Boyce of the Motometer Company, that every car competing in the two Santa Monica events was equipped with this device, which is intended to forestall overheating of the motor.

TWELFTH ANNUAL BOSTON DEALERS' SHOW.

Detailed Plans for the Biggest Exhibition of Automobiles in the World—Only Motor Truck Display of National Prominence This Year—List of Exhibitors.

BOSTON might fittingly be described as the cradle of the automobile industry in America. Long before the commercial possibilities of the horseless carriage were recognized generally, business men in that city apparently were able to foresee, at least in some measure, that one day the manufacture and sale of motor vehicles was to become an industry of sufficient magnitude to

warrant encouragement of those who were engaged in early experimentation. Although the forthcoming Boston automobile show, March 7-14, for pleasure cars, and March 17-21, for commercial vehicles, is styled the 12th annual display, it really is the 16th to be held in that city.



Chester I. Campbell, General Manager, Boston Automobile Show.

The first showing of horseless carriages in America was made in connection with the Mechanics' fair in Boston in the fall of 1896. There were three vehicles, one propelled by steam, a second by gasoline and the third, Kenneth Skinner's imported gasoline tricycle. They formed a part of the bicycle exhibit in the basement of Mechanics' building, in which structure the 1914 display will be held, and where practically all of the Boston shows have been staged. Two years later, for the Mechanics' fair was held only every alternate year, the second automobile show in America took place under the same auspices, and the number on display was increased to five or six.

The third Boston show was held in 1901, in connection with the formal opening of a sales agency for Knox cars on Stanhope street by the firm of Reed & Underhill, composed of George Reed and A. P. Underhill. The fourth was in

1902, under the direction of the Massachusetts Automobile Club in Grand hall, Mechanics' building, and was a most pretentious presentation of the industry's product. In 1903, the dealers of Boston took charge of the enterprise, under the personal management of Chester I. Campbell, and the exhibition of that year has come to be known as the first annual dealers' Boston automobile show.

Boston Dealers' Shows.

The following year, 1904, the Boston Automobile Dealers' Association was formed, and this body had complete charge of the Boston shows until 1912, when it was deemed advisable to separate the business vehicles in a display to be held the week following that for pleasure cars, and the Boston Commercial Motor Vehicle Association was formed to have charge of this section of the exhibition. Chester I. Campbell was retained as manager of both associations, and he has had personal direction of all dealers' shows, as well as numerous motor boat and aeroplane displays in the same building. The statistics of the several Boston automobile shows, so far as they are available, are presented in an accompanying table.

The decrease in number of cars on display in 1908, over that for 1907, is explained by the fact that several concerns were forced to go out of business or to form consolidations during the financial depression of that period. But it will be noted that there has been a steady gain in attendance from the beginning, and in the amount of business transacted the Boston show always has established a new record each year. At the conclusion of the display in 1913 the dealers reported sales aggregating more than \$2,000,000.

GROWTH OF THE BOSTON SHOW.

Year	Makes on Display—		Totals	Attendance
	Pleasure	Commercial		
1903.....	21	*	21	17,360
1904.....	..	..	..	30,000
1905.....	..	..	..	47,000
1906.....	..	..	..	52,165
1907.....	115	6	121	57,213
1908.....	77	7	84	69,000
1909.....	88	18	106	92,000
1910.....	97	25	122	107,600
1911.....	102	41	143	146,363
1912.....	107	66	173	225,000
1913.....	108	68	176	245,000

*Commercial vehicles not listed separately.

The Boston show first secured an international record in the number of cars on display in 1910, when there were 122 different makes and a total of 650 complete cars and chassis on view. The previous record was the Olympia show in London for 1909, when 597 cars and chassis were exhibited. Boston still holds this record, the nearest approach to either mark being the Olympia display of 1910, when 590 cars and chassis were shown.

By way of making comparison with other shows held this season, it may be stated that there were 132 makes represented at the Automobile Salon in Paris, 126 at the Olympia show in London, 79 at the Grand Central Palace in New York and 86 at the Coliseum show in Chicago. The foreign shows do not make the distinction between commercial and pleasure vehicles that is made in this country, and it is only fair in this connection to consider the total number of makes listed for the two sections of the Boston show in making comparison. There are at present 88 makes of pleasure cars and 50 of trucks and business wagons, making a total of 138, which exceeds that of any other show held this season, but, inasmuch as it always has been true that many makes are entered at the last moment, it is safe to predict that this total will be increased very materially before the doors actually open on the second section of the 1914 display. March 17, and Boston is assured of securing another international record in this respect.

Only Truck Display.

This year's Boston show occupies a unique position, because of the fact that it will present the only exhibition of motor trucks and business wagons of national proportions to be held in America this year. As has been stated, the Boston show always has been a dealers' proposition, but its size, in every respect, has at all times been such as to make it rank above even the national shows in New York and Chicago.

As in previous years, the show will be held in Mechanics' building on Huntington avenue. And for the first time in the history of this "Greatest Automobile Show on Earth", the tower will be resplendent with illumination, attracting the attention of the public even from Copley square. In

addition, the exterior of the building will be brilliantly illuminated in a manner distinctively new and attractive.

While no definite announcement has been made concerning the decorative treatment of the interior, it is known that the general motif will be Italian in character, nearly all of the details being from drawings made by Architect Ernest W. Campbell, brother of the manager, while on a special tour through Italy last summer.

The main entrance will be through Exhibition hall, which will be approached through a corridor of marbleized panels, with statues standing out in bold relief against a dense background of foliage, and a magnificent Roman arch. All the massive beam work in Exhibition hall will be completely concealed by handsomely painted en-



Mechanics' Building, Scene of 12th Annual Boston Dealers' Automobile Show.

tablatures, in the Roman style of architecture, while massive columns of verde antique bronze, surmounted by large illuminated glass globes, will set off the various exhibition spaces.

But it is in Grand hall that the architect always has developed his best decorative work, and this year the setting will be Venetian. It is impossible to state the manner in which this will be worked out, beyond citing the fact that the curtain at the rear of the stage will present a cyclorama of the City of the Doges, resplendent in colors, 90 feet long and 30 feet high. The entire ceiling is to be covered with a massive canopy effect, pierced to present open carved work, from which will be dependent eight electroliers, each composed of 12 Venetian wrought iron lanterns. The arches surrounding the entire hall are to be studies adapted from the Ducal palace.

VEHICLE EXHIBITORS AT BOSTON SHOW.

(Where No City Is Given, Address Is That of Boston Agent, Distributor or Branch.)

GASOLINE PLEASURE CARS.

100, 100aa Abbott-Detroit—F. A. Dutton Motor Co., 76 Huntington Ave.
 311 Allen—Allen Motor Co., Eostoria, O.
 232 Apperson—Varnerin & Paddon, 1926 Columbus Ave.
 116 Briscoe—V. A. Charles, 616 Commonwealth Ave.
 136-140 Buick—Buick Motor Co., 17 Lawton St.
 2 Cadillac—Cadillac Automobile Co. of Boston, 372 Boylston St.
 421 Car-Nation—W. B. Doan & Co., 1112 Boylston St.
 326, 327 Cartecar—Hollander Motor Co., 1070 Boylston St.
 101 Case—J. I. Case Threshing Machine Co., 8 Columbus Ave.
 108, 109 Chalmers—Whitten-Gilmore Co., 620 Commonwealth Ave.
 35 Chandler—R. B. Nettleton, 1118 Boylston St.
 107 Chevrolet—Chevrolet Motor Car Co. of N. E., Motor Mart.
 36, 37 Cole—Cole Motor Co. of Boston, 94 Massachusetts Ave.
 113, 114 Flat—Flat Motor Sales Co., 839 Boylston St.
 117, 118 Ford—Ford Motor Co., 650 Beacon St.
 127, 128 Franklin—Franklin Motor Car Co., 616 Commonwealth Ave.
 330, 331 Havers—Havers Motor Car Co., Port Huron, Mich.
 38 Haynes—W. L. Russell Co., Motor Mart.
 254 Herrif-Brooks—Fred C. Carter, Bexley Hall, Cambridge, Mass.
 256 Herreshoff—Herreshoff Motor Sales Co., Troy, N. Y.
 220, 221 Howard—Lexington-Howard Co., Connerville, Ind.
 125, 126 Hudson—Henley-Kimball Co., 893 Boylston St.
 115, 132, 133 Hupmobile—Wentworth-Fosdick Co., 923 Commonwealth Ave.
 320, 324 Imperial—Imperial Automobile Co., 182 Columbus Ave.
 116 Inter-State—V. A. Charles, 616 Commonwealth Ave.
 22, 23 Jackson—Jackson Motor Car Co., 821 Boylston St.
 105, 106 Jeffery—C. P. Rockwell, Inc., 640 Commonwealth Ave.
 421 Keeton—W. B. Doan & Co., 1112 Boylston St.
 332, 333 King—King Motor Car Co., 1008 Boylston St.
 104 KisselKar—KisselKar, N. E. Branch, 940 Commonwealth Ave.
 8, 12 Knox—Knox Automobile Co., 885 Boylston St.
 100, 100aa Krit—F. A. Dutton Motor Co., 76 Huntington Ave.
 134a, 149 Lenox—Lenox Motor Car Co., 18 Columbus Ave.
 227, 228 Lexington—Lexington-Howard Co., Connerville, Ind.
 13, 17 Locomobile—Locomobile Co. of America, 700 Commonwealth Ave.
 115, 132, 133 Losier—Wentworth-Fosdick Co., 923 Commonwealth Ave.
 314-317 Lyons-Knight—Lyons-Atlas Co., Indianapolis, Ind.
 254 Marathon—Fred C. Carter, Bexley Hall, Cambridge, Mass.
 318, 322, 323 Marion—Charles G. Andrews Co., 922 Commonwealth Ave.
 121-123 Marmon—F. E. Wing Motor Car Co., 562 Commonwealth Ave.
 110, 111 Maxwell—Pope-Hartford Co. of Boston, 591 Boylston St.
 145 McFarlan—Middleboro Automobile Exchange, Middleboro, Mass.
 24, 25 Mercer—Fred S. Smith, 38 Columbus Ave.
 150 Metz—Metz Co., 907 Boylston St.
 20 Mitchell—Lawrence & Stanley Co., 157 Massachusetts Ave.
 329 Moline-Knight—Treat Hardware Co., Lawrence, Mass.
 151, 152 Moyer—H. A. Moyer, Syracuse, N. Y.
 26-28 National—W. H. Stevens, 1020 Boylston St.
 135, 141 Oakland—Oakland Motor Co., 100 Massachusetts Ave.
 131 Oldsmobile—Oldsmobile Co. of Mass., 626 Commonwealth Ave.
 129, 130 Overland—Connell & McKone Co., 167 Massachusetts Ave.
 1 Packard—Packard Motor Car Co. of Boston, 1089 Commonwealth Ave.

34 Paige—R. B. Nettleton, 1118 Boylston St.
 146, 233 Pathfinder—Motor Car Mfg. Co., Huntington Chambers.
 14, 18 Peerless—Peerless Motor Car Co. of N. E., 660 Beacon St.
 16, 20 Pierce-Arrow—J. W. Maguire Co., 745 Boylston St.
 110, 111 Pope-Hartford—Pope-Hartford Co. of Boston, 591 Boylston St.
 112 Premier—Premier Motor Car Co. of N. E., 652 Beacon St.
 249-252 Regal—W. L. Russell Co., Motor Mart.
 102, 103 Renault—Alfred Cutler Morse & Co., Motor Mart.
 119, 120 Reo—Linscott Motor Co., 163 Columbus Ave.
 134b Saxon—Whitten-Gilmore Co., 620 Commonwealth Ave.
 142-144 Speedwell—Curtis-Hawkins Co., 162 Columbus Ave.
 15, 19 Stearns-Knight—J. H. MacAlman, 96 Massachusetts Ave.
 5, 9 Stevens-Duryea—J. W. Bowman Co., 91 Massachusetts Ave.
 3, 4 Studebaker—Donovan Motor Car Co., 628 Commonwealth Ave.
 31, 32 Stutz—Stutz Motor Car Co., 895 Boylston St.
 422-424 Velle—Frank L. Roberts, 320 Newbury St.
 147, 148 Westcott—Westcott Motor Car Co. of Boston, 341 Newbury St.
 7, 11 White—White Co., 930 Commonwealth Ave.
 226, 237 Willys-Knight—R & L Co., 915 Boylston St.
 6, 10—Winton—Winton Motor Car Co., 674 Commonwealth Ave.

ELECTRIC PLEASURE CARS.

33 Bailey—S. R. Bailey & Co., 695 Boylston St.
 249-252 Buffalo—W. L. Russell Co., Motor Mart.
 320, 324 Columbus—Imperial Automobile Co., 182 Columbus Ave.
 123a, 124 Detroit—Anderson Electric Car Co., 903 Boylston St.
 153 Ohio—D. C. Tiffany Co., 135 Chestnut St.
 30 Rauch & Lang—Peerless Motor Car Co. of N. E., 660 Beacon St.
 5, 9 Waverley—J. W. Bowman Co., 91 Massachusetts Ave.
 108, 109 Woods—Whitten-Gilmore Co., 620 Commonwealth Ave.

STEAM PLEASURE CARS.

21 Stanley—Stanley Motor Carriage Co., Newton, Mass.

CYCLECARS, LIGHT CARS, ETC.

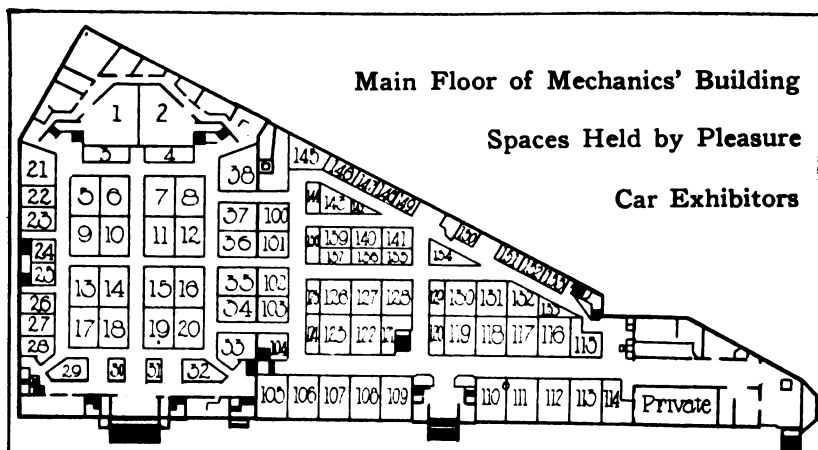
256 Herreshoff—Herreshoff Motor Sales Co., Troy, N. Y.
 313 LaVigne—C. J. Fischer Co., 233 Massachusetts Ave., Cambridge, Mass.
 215 Mercury—A. E. Kenney, 75 Haverhill St.
 334 Merz—Merz Cyclecar Co., Indianapolis, Ind.
 234 Trumbull—Rockledge Garage, Yonkers, N. Y.
 255 Twombly—H. Ross Maddocks Co., 175 Pleasant St.
 215 Victor—A. E. Kenney, 75 Haverhill St.

MOTORCYCLES.

527, 528 Excelsior—Hub Cycle Co., 14 Portland St.
 349 Harley-Davidson—Harley-Davidson Motor Company, 74 Huntington Ave.
 527, 528 Henderson—Hub Cycle Co., 14 Portland St.
 319 Indian—George N. Holden, 188 Massachusetts Ave.
 328 Jefferson—Jefferson Motorcycle Agency, 150 Massachusetts Ave., Arlington, Mass.
 350 Pope—New England Motorcycle Co., 178 Columbus Ave.
 321 Thor—Thor Motorcycle Co., 356 Columbus Ave.
 340 Yale—Puritan Motor Co., Boston.

HOW ACCESSORIES WILL BE DISPLAYED.

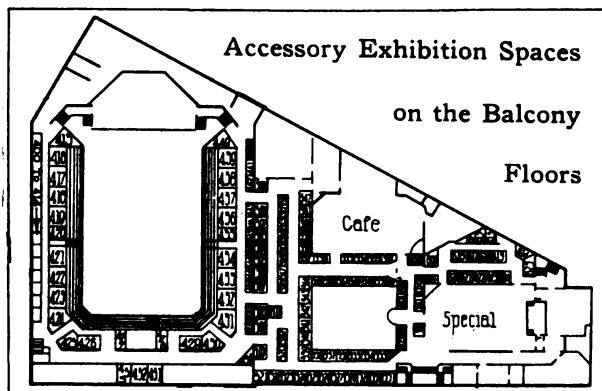
- 557—A. C. C. Oil Company, Providence, R. I., Acco lubricants.
- 550—Acme Torsion Spring Company, 998 Boylston street. Acme torsion springs, shock absorbers.
- 539—Aetna Life Insurance Company, 4 Liberty square. Insurance.
- 558—Ajax Trunk & Sample Case Company, New York City. Trunks, etc.
- 426—American Express Company, 43 Franklin street. Information booth.
- 307, 308—American Lava Company, Chattanooga, Tenn. Alco burner tips.
- 506, 509—American Motor Appliance Company, 69 Washington street. Blazer horns, etc.
- 446—American Storage Battery Company, Albion street, Cambridge, Mass. Harvard storage batteries.
- 561, 562—American Tire Company, Montello, Mass. American airless tires.
- 501—Arnold, N. B., Brooklyn, N. Y. Slik up specialties.
- 325—Auto Electric Trouble Station, 1074 Boylston street.
- 406—Automatic Appliance Company, 172 Columbus avenue. Boston starters for Ford cars, Casgrain speedometers, etc.
- 222—Automatic Tire Rest Company, Kansas City, Mo. Giant automatic jacks.
- 427—B & R Shock Absorber Company, Philadelphia, Penn. B & R shock absorbers.
- 305—Baker, W. A., Melrose, Mass. Marvel combination sets.
- 356bb—Barnstead Water Still Company, 51 Chardon street. Specialties.
- 504—Bascom, George R., 224 Columbus avenue. Basco Ford exhaust horns, Truffault-Hartford shock absorbers, Wasson concentric piston rings, etc.
- 328—Baxter Side Car Company, Toledo, O. Baxter side cars.
- 511—Blodgett & Johnson, 421 Tremont street. Sundries.
- 553—Bonner Company, D. Henry, 96 Plympton street, Cambridge, Mass. Tremo horns, etc.
- 619—Boston Tire & Rubber Company, 182 Friend street. Nassau tires, Thermoid reliners, etc.
- 432—Bowser & Co., S. F., 141 Milk street. Bowser storage systems.
- 449—Boyd, F. Shirley, 903 Boylston street. R. I. V. ball bearings, Multibestos brake lining, J. H. S. shock absorbers.
- 522—Braender Rubber & Tire Co., New York City. Braender tires.
- 525—Brock Rubber Company, A. S., 122 Milk street. Hose and rubber specialties.
- 307, 308—Burlington & Co., C. A., Berkshire, N. Y. Burlington folding chairs.
- 555—Burn Boston Battery & Manufacturing Works, Cambridge, Mass. Burn Boston batteries.
- 410—Calnan, James P., West Upton, Mass. Calnan tire removers.
- 513—Campbell Company, A. S., 284 Commercial street. Cello searchlights, battery cases, hot water bottles, etc.
- 360, 364—Cape Cod Power Dory Company, Wareham, Mass. Marine motors.
- 425—Cataract Tire & Rubber Company, 66 Hereford street. Cataract tires.
- 417—Champion Spark Plug Company, 954 Tremont street. Spark plugs.
- 243-247—Chandler & Farquhar Company, 419 Atlantic avenue. Machine tools, etc.
- 310a—Colby, C. B., Boston. Floral decorations for cars.
- 540—Collins, George, 280 Columbus avenue. Tubes, casings, boots, etc.
- 500—Columb Tyres Import Company, New York City. Prowodnik tires.
- 450—Combination Tail Light Company, Boston. Combination electric tail light and number holder.
- 541, 542—Connell Co., W. J., 171 Massachusetts avenue. Schebler carburetors, Elite jacks, Edmunds & Jones lamps, Gabriel horns, Gabriel rebound snubber, Spar-ton horns, fan belts, etc.
- 408—Cox Company, A. W., Heywood street, Cambridge, Mass. Automobile and motor truck parts and supplies.
- 603—Cox Brass Manufacturing Company, Albany, N. Y. Cox rebound E-Zers, Cox combined welding and carbon remover, Coxadusto shock absorbers, etc.
- 531—Cutter, Frank J., 30 Amherst street, Cambridge, Mass. Automobile bodies.
- 306—Dahl Manufacturing Company, New York City. Master slide rules, etc.
- 522—Dayton Tire Company, 589 Boylston street. Dayton airless tires.
- 238—Dean Auto Devices Company, Chicago, Ill. Dean Fordons, Dad wheel push buttons.
- 505—Deery & Co., D. H., Bridgeport, Conn. Deery electric motor truck tires.
- 304—Dodge, Frank, 420 Boylston street. Aiken revolving automobile lamps.
- 556—Eagle Oil & Supply Company, 104 Broad street. Eageline No-Karbon oils.
- 429—Earnsdale Worsted Company, Clinton, Mass. Moto-kloth upholstery materials.
- 336—Eastern Oil Tank Company, Lowell, Mass. Gasoline and oil storage systems.
- 358—Evenson & Sons, J., Camden, N. J. Jesco soaps and polishes, screw drivers, hydrometer syringes.
- 307—Edelman & Co., E., Chicago, Ill. Reliable tire gauges, Perfecto.
- 554—Elsner-Lenk Company, 1074 Boylston street. Else-



- mann, Mea and Simms magnetos, Gelszler storage batteries, Gilbert tire covers, etc.
- 541, 542—Elite Manufacturing Company, Ashland, O. Elite jacks.
- 302—Essex Engine Company, Lynn, Mass. Marine motors.
- 419, 420—E. Z. Rim Company, 146 Summer street. E. Z. rims.
- 609—Flentje, Ernst, Cambridge, Mass. Flentje shock preventers.
- 620, 621—Forbes, Walter J., 243 Columbus avenue. K-W ignition devices, Knajar shock absorbers, etc.
- 411, 412—Ford Company, Percy, 226 Columbus avenue. Ford specialties and other accessory lines.
- 512—Forest City Electric Co., Cleveland, O. E-Z Rider shock absorbers for Ford cars.
- 325—Fox Auto Searchlight Company, Providence, R. I. Fox swivelling headlights.
- 337, 348—Fryer, Charles H., Providence, R. I. Tonneau windshield.
- 403—G. I. M. Vulcanizing Company, 1002 Boylston street. Tires and other accessories.
- 545—Green & Swett Company, 737 Boylston street. Tri-Phoon tire pumps and other accessories.
- 441—Gurnard Manufacturing Company, Beverly, Mass. Pneumatic tire coupling.
- 404—Harding Specialties Company, 755 Boylston street. Boston tail light detectors.
- 256a—Harding, W. A., Boston, Mass. Specialties.
- 445—Hillman Auto Supply Manufacturing Company, 98

Massachusetts avenue. Samples of radiator, lamp and windshield repairing, plating, oxidizing, enamelling, etc.

358a—Holt & Beebe Company, 51 Chardon street.



Lamps and electric specialties.

618—Holtzer-Cabot Electric Company, Brookline, Mass. Newcomb carburetors, Holtzer-Cabot electric lighting systems, Reacto horns, etc.

538—Hopewell Bros., Newton, Mass. Hopewell tire cases, tool bags, soaps, etc.

416—Houk, George W., Buffalo, N. Y. Houk wire wheels.

405—Hutton Company, Fred W., Brockton, Mass. Sole leather mats, mats for Ford cars, etc.

562a—Hydraulic Oil Storage & Engineering Company, New York City. Hydraulic oil storage systems.

517, 518—Indian Refining Company, 35 Central wharf. Havoline oils.

352—International Metal Polish Company, New York City. Blue Ribbon metal polish, radiator cements, etc.

537—Invader Oil Company, 284 Columbus avenue. Invader oils, I-O-C gear lubricants, etc.

552—Jackson Company, Charles A., Motor Mart. Starting, lighting, heating and recording systems.

301—Jager Engine Company, 13 Custom House street. Marine motors.

413, 414—Jeffery-Dewitt Company, Detroit, Mich. Spark plugs and ignition devices.

543, 544—Johns-Manville Company, H. W., 55 High street. J-M asbestos and other products, Jones speedometers, J-M (Metzger) spark plugs, Carter carburetors, Long horns and general line of automobile specialties.

442—Justice Company, A. R., Philadelphia, Penn. U-Kan-Plate polishes.

300a—Kanner, Samuel, New York City. Specialties.

607—Keating & Decker, Newton, Mass. Devine tires.

307, 308—Kelleher, J. J., Dorchester, Mass. Typhoon horns, etc.

547—Keystone Lubricating Company, 284 Franklin street. Keystone lubricants.

610—Kilgore Motor Starter Company, 811 Barristers hall. Kilgore starters.

439—Knauss, Edward, 222 Elliot street. J-M shock absorbers, K. P. foot rest heaters, etc.

242—Lapointe Company, J. N., New London, Conn. Machine tools, etc.

241—Leland-Gifford Company, Worcester, Mass. Machine tools, etc.

505—Lewis Manufacturing Company, Bridgeport, Conn. Lewis mechanical gearshifts.

338, 347—Linseott Supply Company, 161 Columbus avenue. General line of accessories and garage equipment.

523—Marathon Tire & Rubber Company, Cuyahoga Falls, O. Marathon tires.

502—Marburg Bros., New York City. Mea magnetos, Marburg-Lucifer motorcycle lighting outfits, S. R. O. ball bearings, etc.

507—Mark Motor Supply Company, 49 Fairfield street. General line of accessories and supplies.

604—Max Machine Company, Clinton, Mass. Magic clincher tire tools.

309a—Meyers Bros., New York City. Egyptian novelties.

435—Miller, Chas. E., 202-204 Columbus avenue. Miller spark plugs, Miller's Pan-American lubricants, Brampton chains and full line of automobile specialties.

431—Moore-Smith Company, 250 Devonshire street. Clothing.

558—Motor Accessories, Inc., 94 Massachusetts avenue. General line of accessories.

434—Motor Parts Company, 187 Columbus avenue. Bosch magnetos and plugs, Zenith carburetors, Leak Proof piston rings, Mohawk tires, etc.

407—Motor Supply Shop, 925 Boylston street. Colstad tire pumps.

408—Murphy, H. J., Reading, Mass. Wireless dash lights. —National Highways Association, South Yarmouth, Mass. Information booth.

444—National Rubber Company, St. Louis, Mo., Narco tire repair materials, polishes, etc.

309—New England Telephone & Telegraph Company, Boston. Information booth.

307, 308—New York Coil Company, New York City. Nyco ignition specialties, Speederup and other supplies.

235—Norton Company, Worcester, Mass. Grinding wheels, etc.

236—Norton Grinding Company, Worcester, Mass. Grinding materials.

521—Parker Carburetor Company, Shoe & Leather building, Cambridge, Mass. Parker carburetors.

500—Parker-Hammerton Manufacturing Company, 122 Milk street. Pomo pocket trouble lamps.

605—Peerless Motor Specialty Company, New York City. Specialties.

444—Pendleton, A. E., 616 Columbus avenue. Narco tire repair materials, polishes, etc.

303—Perfection Filler Company, Somerville, Mass. Tire fillers.

500—Platt & Washburn Refining Company, New York City. Lubricants.

535—Potter Co., Howard, 1000 Boylston street.

436—Presto Inter-Rim Company, 883 Boylston street. Presto rims.

402—Rand, H. L., Worcester, Mass. Decorative specialties.

427—Reed, W. P., 65 Shirley street. B & R shock absorbers.

540—Reliance Speedometer Company, 134 Elliot street. Reliance speedometers.

524—Robbins Company, Lynn, Mass. Kennedy carburetors.

526—Robinson & Son Company, Wm. C., 43 Commercial wharf. Lubricants.

306a—Rose, P. R., Boston. Microscopes.

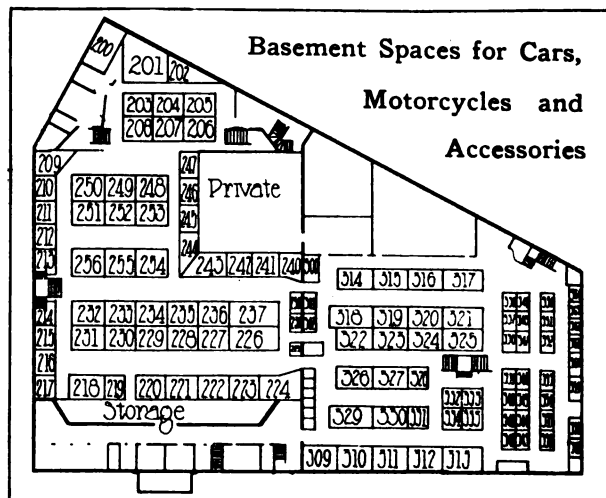
533—Rutherford Rubber Company, 218 Pleasant street. Rutherford tires.

600—S & A Manufacturing Company, 263 Summer street. Quixet wrenches.

601—Sage Trunk Company, 134 Summer street. Trunks, etc.

608a—Salman, John A., 17 Bromfield street. Monograms, etc.

540—Sawyer Oil Company, Howard B., 65 Long wharf.



Lubricants.

430—Scott & Co., 340 Washington street. Clothing.

239—Sharrer Patent Top Company, New York City. Sharer one-man tops.

- 536—Shaw-Lundin Auto Company, 171 Huntington street. Greater Three-in-One carburetors.
 529—Shimpf Starter Company, 178 Devonshire street. Shimpf air starter.
 534—Smith Tire Valve Company, Boston. Smith patented tire valves.
 418—Speedolene Lubricant Company, Malden, Mass. Lubricants.
 523—Standard Motor Parts Manufacturing Company, Philadelphia, Penn. Red Devil exhaust horns.
 437, 438—Standard Oil Company of N. Y., 50 Congress street. Polarine oils, gasoline, etc.
 406—Standard Signal Lamp Company, Bridgeport, Conn. Direction signal lamps.
 448—Standard Woven Fabric Company, Framingham, Mass. Multibestos brake linings, etc.
 428—Sutcliffe, C. T. W., Fall River, Mass. Chester demountable rims.
 433—Texas Company, 146 Summer street. Texaco oils, storage systems.
 447—Tobey, W. L., 9 Lewis street, South Boston. Tobey rim removers, Tobey glare removers.
 530—Tolman Manufacturing Company, 19 Third street, South Boston. Tolman's welding and cutting apparatus, Norfolk Oxy-Oil decarbonizers.
 519, 520—Underhay Oil Company, 73 Batterymarch street. Lubricants.
 503—Universal Lubricating Company, Cleveland, O. Tule petroleum lubricants.
 443—Universal Refining Company, 32 Central wharf. Urco lubricants, soaps and polishes.
 516—Walker Lithograph & Publishing Company, 400 Newbury street. Maps, etc.
 339, 340—Wayne Oil Tank & Pump Company, 146 Summer street. Wayne oil storage systems.
 413, 414—Wilson Company, John V., 220 Pleasant street. Apco Ford specialties, A. V. shock absorbers, Rhineland ball bearings, Rexo and Maxo horns, Aermore exhaust horns, Jeffery-Dewitt spark plugs, Victor lamps, Victor tool boxes, Rusco brake linings, etc.
 611—Yankee Motor Economy Company, 169 Massachusetts avenue. Humefying gas savers.
 602 B—Zetterman Machinery Company, 6 Beacon street. Specialties.

RUSSIAN TIRE FACTORY.

Something Concerning the Plant at Riga, Where Prowodnik Tires Are Made.

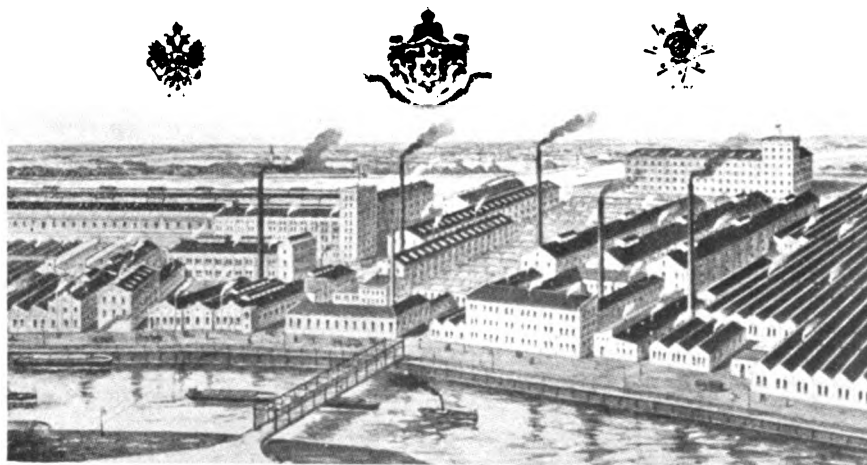
An accompanying illustration presents a portion of the Prowodnik tire factory at Riga, Russia, where the labor conditions are held to be such that the product is not burdened with the necessity for speed in manufacture, and where in many cases father and son have worked for generations. This tire is now being sold in America, through the Columb Tyres Import Company, New York City, for which the Park Square Motor Mart Garage is Boston distributor.

It is maintained that Prowodnik tires were designed especially to meet the road conditions found in Russia, and, as most Americans are aware, these are by no means ideal. The peculiar formation of the reverse herring-bone tread, called the Columb, is said to have been worked out theoretically by Russian engineers, after which it was given a number of practical tests on the Russian steppes, before finally being placed on the market.

As will be noted, the factory is of extensive proportions, and it is explained by the company that the manufacturing conditions are ideal. The tires are made of what is regarded as the correct proportion of Para rubber and fabric, and extreme care is taken in building up the casing, so as to give the core the same elasticity as the tread. The sidewalls are held to be of excep-

tional thickness, and the construction at the bead is with a view to eliminating rim-cutting. The line will be displayed at the Boston show.

The Mercury Manufacturing Company, Chicago, maker of Mercury trucks, finds that the similarity of its name to that of the Mercury Cyclecar Company of Detroit, maker of the Mercury cyclecar, has occasioned some little confusion, since it is in receipt of considerable correspondence regarding the cyclecar. The Chicago



Partial View of the Plant at Riga, Russia, Where Prowodnik Tires Are Made to Meet Russian Road Conditions.

concern has been producing a 1000-pound delivery wagon for the past four years, and is in no way connected with the Detroit company.

Announcement is made that the Van Sicklen Publishing Company, Monadnock building, Chicago, has purchased Motor Field, heretofore published by G. A. Wahlgren in Denver, Col., and that the publication office will be transferred to Chicago.

BIG GAIN IN EXPORTS DURING 1913.

COMPLETE returns from the bureau of foreign and domestic commerce, Department of Commerce, Washington, D. C., for the year, 1913, show a tremendous gain in the value of automobiles and parts exported by American manufacturers, over the preceding year. The total value of cars shipped abroad during 1913 was \$27,029,451, as against \$23,703,989 for 1912, and \$15,924,361 for 1911. This is a gain of 12.5 per cent. over 1912 and 41 per cent. over 1911. If the value of the parts be added, the figures for 1913 are \$33,299,567, as against \$28,308,118 for 1912 and \$19,178,584 in 1911, or a gain of 15 per cent. over 1912 and 42 per cent. over 1911.

statistics supplied by the government do not give the number of commercial cars shipped into this country, but the total of all cars was 492.

The tabulation also shows the comparative results for December in 1912 and 1913, indicating a substantial gain in exports. Rather more interest attaches to the imports in this connection, however, because of the new tariff law, which went into effect in October. The figures for December show a reduction of nearly 60 per cent. in the value of cars shipped into the country for that month in 1913 as compared with the same month in 1912.

It is somewhat surprising to note that the val-

ANNUAL REPORT CONCERNING IMPORTS AND EXPORTS.

IMPORTS.

	December				Year					
	1912		1913		1911		1912		1913	
	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value
France	43	\$100,589	22	\$56,187	341	\$770,643	469	\$1,123,584	196	\$467,167
Germany	7	19,523	1	3,570	160	350,239	63	152,860	81	214,701
Italy	10	18,909	5	9,240	131	203,733	109	174,412	85	153,039
United Kingdom.....	15	51,523	6	16,990	173	403,506	137	347,776	54	161,667
Other countries	12	37,108	4	7,668	167	370,360	90	200,955	76	158,299
Totals.....	87	\$227,652	38	\$93,655	972	\$2,098,481	868	\$1,999,587	492	\$1,154,873
Parts (except tires) ..	..	12,694	..	138,487	....	347,767	....	275,819	....	447,938
Grand totals.....	..	\$240,346	..	\$232,142	....	\$2,446,248	....	\$2,275,406	....	\$1,602,811
EXPORTS.										
France	30	\$29,123	120	\$100,418	420	\$449,757	698	\$531,163	921	\$710,149
Germany	12	18,516	58	45,810	115	124,615	450	366,914	1,017	857,103
Italy	21	16,335	12	11,236	176	199,986	288	257,050	314	270,315
United Kingdom	269	215,753	648	484,299	4,031	3,380,266	4,640	3,518,671	5,152	3,966,600
Other Europe	110	116,532	160	135,183	795	718,360	1,549	1,295,379	1,846	1,570,678
Canada	557	604,560	227	307,170	4,988	5,552,931	7,421	8,859,694	6,051	8,177,256
Mexico	41	86,937	14	21,254	297	490,041	274	459,023	227	408,148
W. Indies and Bermuda	54	60,660	72	70,166	300	343,281	370	391,890	527	515,762
South America	342	374,183	239	234,905	1,116	1,356,445	2,201	2,539,166	2,713	3,008,045
British Oceania	273	239,961	495	431,530	2,476	2,217,762	3,385	3,091,966	3,564	3,286,860
Asia and other Oceania	181	176,011	137	134,891	813	795,576	1,650	1,640,369	2,367	2,353,788
Other countries	123	122,241	207	175,282	280	295,341	794	752,704	2,190	1,904,747
Totals.....	2,013	\$2,060,812	2,389	\$2,152,144	15,807	\$15,924,361	23,720	\$23,703,989	26,889	\$27,029,451
Parts (not including engines and tires) .....	..	367,364	....	540,042	....	3,254,123	....	4,604,129	....	6,270,116
Grand totals.....	..	\$2,428,176	....	\$2,692,186	....	\$19,178,484	....	\$28,308,118	....	\$33,299,567

During the same period the value of cars imported into the United States was \$1,154,873, as against \$1,999,587 for 1912 and \$2,098,481 for 1911. This means a loss of 42 per cent. over 1912 and 45 over 1911. If the value of the parts be added the figures for 1913 are \$1,602,811, as against \$2,275,406 for 1912 and \$2,446,248, showing a loss of 25 per cent. over 1912 and 26 per cent. over 1911.

The detailed figures are presented in an accompanying table, but these do not include the number of passenger and commercial vehicles separately. There were 25,880 of the former shipped abroad, at a valuation of \$25,342,644, and 1009 commercial cars, valued at \$1,686,807. The

uation of parts brought in during December, 1913, was more than 10 times as great as for the same month in 1912. It will be remembered in this connection that the duty on finished parts was reduced in the new tariff law from 45 per cent. to 30. Whether or not this has any bearing on the official government report is, perhaps, too early to determine.

It may be stated that the 88 commercial vehicles, valued at \$100,660, were shipped abroad during December, 1913, as against 87, valued at \$156,350, during the same month in 1912. The comparison on passenger cars is as follows: December, 1912, 2301, valued at \$2,051,484; 1913, 1926, valued at \$1,895,462.

NEW TIRE POLICY.

Goodyear Will Make Adjustments Only for Faulty Workmanship and Material.

According to information from Akron, O., the Goodyear Tire & Rubber Company of that city has adopted a new policy with respect to making adjustment for tires made by it. Under the new plan, it is understood that adjustments will be made only for failure due to faulty workmanship or material, and none will be made where it is certain that the trouble is due to stone bruises or other causes resulting from careless driving.

It is also stated that the Goodyear company has formally taken over the manufacture and sale of Standard tire protectors as a part of its automobile tire department. This is a separate tread which covers the sidewalls as well as the tread, and when applied remains firmly in place without additional fastening.

TWO SHOWS IN CINCINNATI.

First Week Devoted to Pleasure Cars and Three Days for Truck Exhibitors.

The fourth annual show of the Cincinnati Automobile Dealers' Association was opened in Music hall, Cincinnati, O., Feb. 21. This year the show is divided into two sections, this first week being devoted entirely to pleasure cars and their accessories, while the first three days of the week beginning March 2 will witness a separate display of motor trucks and business wagons.

It may be added that this is the second exhibition of cars to be made in that city this year, the first having come to a close Feb. 14, under the auspices of the Cincinnati Automobile Trade Association. This also was responsible for a court action, inasmuch as the Junglas Automobile Company displayed Overland cars in the first show. The court held that, as this company was a member of the Cincinnati Automobile Dealers' Association in good standing, it could not be prevented from making display at that organization's exhibition. This is a point of some little interest, since many dealers' associations throughout the country have rules similar to that in Cincinnati, which seek to prevent members from making display in shows held by other organizations.

The attendance at the second show was decidedly large, and much business was transacted. The list of exhibitors included the following:

Chas. Behlen's Sons, Detroit electric; Cincinnati Automobile Company, Stutz, Pope-Hartford; Citizens Motor Car Company, Packard; Fischer Auto & Service Company, Locomobile, Chalmers; Ford Motor Car Company, Ford; Franklin Motor Car Company, Franklin; Hanauer Automobile Company, Pierce-Arrow; Hellman Motor Car Company, Haynes; Herschede Motor Car Company, Rauch & Lang electric; Imperial Motor Car Company, Stearns-Knight, Baker electric; Junglas Automobile Company, Overland; Kentucky Motor Car Company, Oakland; Kruse Motor Car Company, Marmon; Leyman-Buick Company, Buick; Geo. C. Miller Sons, Cole, Standard electric; Ratterman Motor Car Company, Maxwell; Chas. Schlear Motor Car Company, Hupmobile, Apperson; Stevens-Duryea Company, Stevens-Duryea; Towle-Cadillac Company, Cadillac; Welbon Motor Car Company, Hudson.

The following exhibitors were listed for the commercial vehicle display:

Cincinnati Motor Truck Company, Universal; Citizens Motor Car Company, Packard; Hanauer Automobile Company, Pierce-Arrow; Hellman Motor Car Company, Commerce; Kruse Motor Car Company, Kelly; Leyman-Buick Company, Buick.

FIRST AID TREATMENT.

West Side Y. M. C. A. Automobile School Adopts an Innovation in Instruction.

The automobile school conducted by the West Side Y. M. C. A., Eighth avenue and 57th street, New York City, is one of the oldest in the country, and it is not surprising to learn that it has adopted another innovation, which is expected to meet with the same high degree of approval as other plans which have been put into force by this institution. In the future, all graduates of this school will be in a position to render first aid treatment to any person who may be injured as the result of unavoidable accidents, or otherwise.

Dr. Theron W. Kilmer, formerly surgeon of the National Guard of New York State, will be in charge of the class in first aid to the injured. Several weeks ago students in the automobile school were informed of the plan to add this course and the statement was greeted with decided approval. Dr. Kilmer, who is recognized as a specialist in this field, volunteered his services.

The course will lay special emphasis on the treatment of gasoline burns, bruises, broken limbs, etc. Dr. Kilmer asserts that every automobilist should be an expert in first aid treatment and that he should carry a first aid kit in his machine as a part of his regular equipment. He adds that most men are fortunate enough never to be injured or to injure anyone else, but no man can tell when he will need such knowledge.

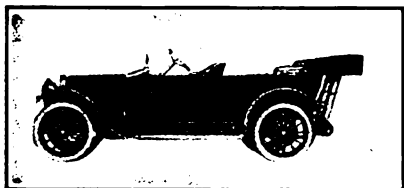
The first dirt track race meet of the season will be held at Hot Springs, Ark., March 9.

CARS SEEN IN BOSTON FOR THE FIRST TIME.

ALLEN 40.

Moderately Priced Car with Two and Five-Passenger Bodies.

The Allen 40 is manufactured by the Allen Motor Company, Fostoria, O., and was designed to meet the de-



mand for a moderately priced car, having those refinements and the high grade material characteristic of machines listing at a higher figure. Two bodies are fitted to the one chassis, a five-passenger touring and a two-passenger roadster. These have attractive lines and are complete in appointments.

The four-cylinder motor, clutch and gearset are a unit, the first named having a bore of 4.125 inches and stroke of five. Carburetion is by a Schebler and ignition by Splittdorf magneto. The wheelbase is 118 inches and the tires 34 by four. The driver is at the left. The equipment includes the Auto-Lite systems of electric lighting and starting.

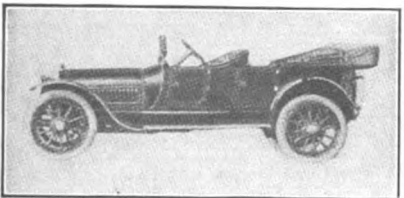
CHANDLER SIX.

Light Weight, Big Mileage and Moderate Price Among Its Features.

Organized about a year ago, the Chandler Motor Car Company, Cleveland, O., is producing the Chandler Six, which is stated to weigh less than 3000 pounds when fully equipped, and its designers, who have long been identified with the industry, claim 16 miles to a gallon of fuel and 700 miles to a gallon of lubricant. Its moderate price is another feature of the product.

The motor is constructed in the factory of the company, and is of the L head type, with the six cylinders cast in triplets. It is in the long stroke class, the bore being 3.375 inches and the stroke five. One of the features of the power plant is the use of extensions from the crankcase, which fit to the frame, obtaining weather proof qualities and eliminating the usual undershield.

The oiling system is contained within the motor, a rotary pump located in the engine pan pumping the lubricant to all main bearings and working parts. The individual trough



system is utilized. The transmission is a three-speed selective gearset, enclosed within the case housing the multiple disc clutch and all bearings are F. & S. imported annular. The lighting and motor starting system is a Westinghouse.

HOWARD SIX.

Utilizes Unit Power Plant and Two Separate Ignition Systems.

The first models of the Howard Six were introduced about the time of the 1913 Chicago show. The latest models are manufactured by the Lexington-Howard Company, recently organized in Connersville, Ind. Only one chassis is produced, to which a two-passenger roadster and a seven-passenger touring car body are fitted. Particular attention is drawn to the large baggage carrying compartment in the rear deck of the roadster.

The motor is an L head type, with the six-cylinders cast in triplets. The bore is 4.125 inches and the stroke 5.25. Ignition is by two separate systems, an Atwater Kent Unisarker with automatic spark advance and LBA battery, and a Boston high-tension spark magneto. Another feature is the use of a multiple exhaust manifold.



by means of which the exhaust from three forward cylinders is taken through a separate compartment from that of the other three. The clutch is a cone, and the selective transmission affords three speeds forward and reverse. The driver is at the left with central control levers. The wheelbase is 130 inches.

PACKARD 4-48.

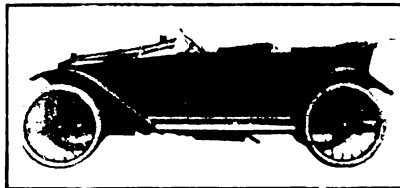
An Addition to the Line Announced for the Boston Show.

Of course, the Packard line, made by the Packard Motor Car Company, Detroit, is not new to the Boston show, but the maker has decided to reserve the initial display of the new 4-48 until this time, this particular model having been announced since the holding of the New York and Chicago exhibitions. It is a six-cylinder chassis, embodying all the features of the 2-38, with the added advantage of more surplus power. The motor has bore of 4.5 inches and stroke of 5.5. The wheelbase is 144 inches and the tires 37 by five inches. The body designs are the same as with the 2-38, with the addition of the salon touring car, in which the front seats are of separate construction, and a special all-weather design, made by the Springfield Metal Body Company, Springfield, Mass.

CAR-NATION MODEL C.

Produced Also in Two-Passenger Designs in Light Weight Class.

The Car-Nation is the product of the American Volturette Company, Detroit. It made its initial appear-



ance just before the advent of the cyclecar in this country, and two of its models have been classed as cyclecars, although they do not come strictly within the definitions of such machines recently adopted. Model A is a two-passenger roadster, weighing 1050 pounds, and model B is a tandem two-seater, weighing 1150.

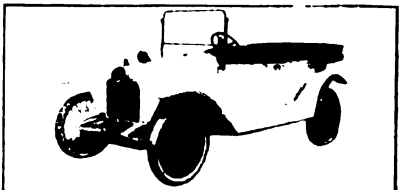
Model C is a touring car, seating four persons. All chassis utilize the same motor, which is a four-cylinder, L head unit, cast en bloc, with bore of 3.375 inches and stroke of 3.75. Power is transmitted through a multiple disc clutch and selective three-speed gearset. The wheelbase is 104 inches and the tires 30 by three inches, fitted to wire wheels. A distinctive feature is the use of a pointed radiator.

BRISCOE.

A Car Which Was Originated in France by American Engineers.

The Briscoe had its origin in France, where it is made by the Briscoe Freres, composed of Benjamin and Frank Briscoe, two men who have long been identified with the industry in this country. It is being produced in America by the Briscoe Motor Company, with executive offices at 7 East 42nd street, New York City, and factory in Jackson, Mich. But one chassis design is manufactured, this being fitted with a two-passenger roadster and a five-passenger touring body.

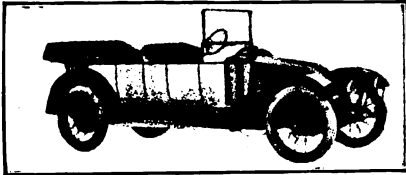
The four-cylinder motor is a block casting of the L head type, with bore of 3.2 inches and stroke of 5.125. Power is transmitted through a cone clutch and a three-speed selective gearset. The wheelbase is 106 inches and wire wheels are employed. A distinctive feature of the design is the use of a single headlight mounted directly over the radiator at the extreme front, practically flush with it.



KEETON SIX-48.

A Machine of the So-Called French Type, with Five Body Designs.

The American Volturette Company, Detroit, is also producing the Keeton Six-48, a high grade car, which is held



to possess many of the characteristics of the so-called French type. This is particularly noticeable in the use of a hood of foreign design, incorporated with which is the radiator directly in front of the dash. Five body designs are fitted to the one chassis, these being a two-passenger roadster, seven-passenger touring, three-passenger convertible, five-passenger convertible and seven-passenger berline-limousine.

The motor is an L head type, with its six cylinders cast en bloc. The bore is four inches and the stroke five. Ignition is by Elsemann dual high-tension magneto with automatic spark advance. Power is transmitted through a multiple disc clutch and four-speed selective gearset. The wheelbase is 136 inches and the wire wheels are fitted with 34 by 4.5-inch tires. The equipment is most complete, including the Jesco electric starting and lighting system.

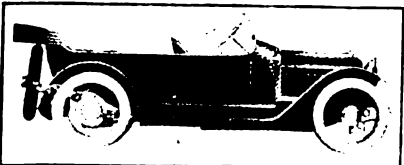
WILLYS-KNIGHT.

Changes Adopted Since Car Was Seen Last Year as Edwards-Knight.

Although the Willys-Knight is in many respects the same as the Edwards-Knight, which was shown last year at Boston, the rights to manufacture this machine having been taken over late in 1913 by John N. Willys of the Willys-Overland Company, several changes have been made, largely in the nature of refinements. Only one chassis is produced, to which a roadster and a five-passenger touring body are fitted, in the old Garford plant of the Willys-Overland Company at Elyria, O., where the motors also will be made.

The four cylinders are cast in pairs, with bore of four inches and stroke of 5.5. The only changes in the motor are in the use of a specially designed Stromberg carburetor and a new method of lubrication. The latter is designated as an automatic system, by means of which the supply of oil is proportioned to the speed of the motor, through a throttle connection. The pump is of the plunger type.

Distinctive features, which have



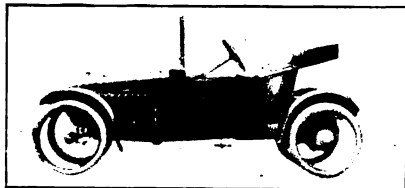
been retained, include the use of the oil submerged worm gear rear axle, Lanchester cantilever type rear spring suspension and wire wheels. The wheelbase is 120 inches and the tires 36 by 4.5 inches. The equipment is complete in every detail.

SAXON ROADSTER.

An Interesting Light Weight Car of Simplified Construction.

While there is bound to be more or less confusion from the indiscriminate use of terms, the Saxon roadster, made by the Saxon Motor Company, Detroit, rightfully belongs in the automobile class. It is in no sense a cyclecar, despite the low power of its motor and its generally simplified design and construction. The equipment includes a top and windshield, wire wheels and everything essential.

The motor is rated at 11 horsepower. It is of the L head type, with fully enclosed valves. The four cylinders and crankcase are cast en bloc, with bore of 2.625 inches and stroke of four. Lubrication is said to be by an entirely new method, which is termed a vacuum splash, oil being circulated and held at a constant level without a single moving part. The carburetor is a Mayer. Ignition is by the Atwater Kent Unisparker and six dry cells. The clutch is an asbestos lined, dry plate, five-disc type, and the progressive transmission affords two forward speeds and



reverse. The wheelbase is 96 inches and the wire wheels are fitted with 28 by three-inch tires.

NATIONAL SIX.

Innovation of Well Known Maker Will Be New to Boston Display.

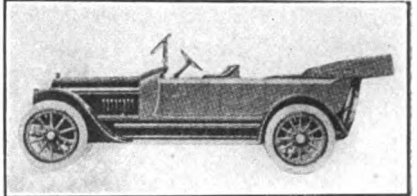
Although the product of the National Motor Vehicle Company, Indianapolis, Ind., has been displayed at previous Boston shows, this concern recently announced a new six, which will be exhibited for the first time in New England at the forthcoming display. Heretofore National cars have been presented only in four-cylinder models.

The motor is cast en bloc, with bore of 3.75 inches and stroke of 5.5. Lubrication is by splash with pressure feed to the main bearings and timing gears. The ignition system is dual, magneto and battery. The cone clutch may be removed without disturbing the transmission. Another feature is the use of an adjustable clutch pedal, while a radical departure is found in the adoption of a cantilever type rear spring, so arranged that the entire end thrust of the car is taken through this, probably the first attempt to utilize a cantilever spring as a propulsive member. New body designs are also supplied with this model.

JEFFERY SIX.

Maker of Former Rambler Machine Also Lists the Jeffery Four.

The Thomas B. Jeffery Company, Kenosha, Wis., well known in the industry as the maker of the Rambler,



has decided to perpetuate the name of the founder of the company by designating its product in the future as the Jeffery. There are two models, a four and a six-cylinder, the latter of which is entirely new. This will be produced in five body types, roadster, four and six-passenger touring, sedan and limousine.

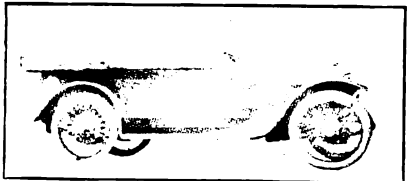
The motor is with cylinders arranged in pairs. The bore is 3.75 inches and the stroke 5.25. One of the features is the water jacketing of the intake manifold, and it is also noted that the undershield has been eliminated, being replaced by plates extending from the frame to the crankcase. Between the gearset and the cone clutch is a leather universal coupling, consisting of six rings about six inches in diameter, and .1875 inch thick, which is employed to take care of any misalignment, and it is stated that shocks and stresses are avoided in the clutch action.

MOLINE-KNIGHT.

Utilizes Block Casting and Thermo-Syphon Cooling System.

The Moline Automobile Company, East Moline, Ill., is the first concern in this country to employ a Knight sliding sleeve valve motor with cylinders cast en bloc. It also has departed from the usual practise with these motors in employing thermo-syphon method of cooling. By reason of the fact that the result of the recent remarkable endurance test of the Moline-Knight engine in the laboratory of the Automobile Club of America has had such wide circulation, it would seem superfluous to make particular reference to this motor at this time.

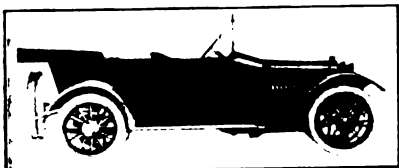
The Moline-Knight is produced in one chassis and body model, this being a five-passenger touring car, which is ironed for two extra seats, making it readily convertible into a seven-passenger machine. Many refinements in design and construction are noted, these including a longer wheelbase of 128 inches; larger tires (36x4.5), and complete equipment.



LEXINGTON FOUR.

Product of a New Company Redesignated, but Bears Its Old Name.

Although the name Lexington is by no means new to the industry, the four-cylinder Lexington car present-



ed by the recently incorporated Lexington-Howard Company, Connersville, Ind., really is a new design. It was first announced during the recent Chicago show, and will be produced as a five-passenger touring car and a roadster. A feature is the use of patent adjustable seats, and it may be added that the tire carrier is made integral with the chassis frame.

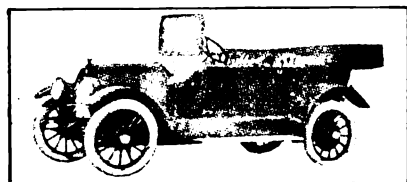
The motor is of the L head type, with bore of four inches and stroke of five. It follows so-called standard practise in the main, but an unusual feature is the incorporation of the Moore exhaust, wherein the waste gases from two of the cylinders are carried away in a separate branch of the manifold from that which takes care of the other two cylinders. Ignition is by the Atwater Kent Unisparker, utilizing an LBA storage battery. Carburetion is by a Schebler. Cooling is by centrifugal pump. The clutch is a cone and the transmission affords three forward speeds and reverse. The wheelbase is 114 inches.

KING MODEL B.

Latest Product of a Pioneer Designer Utilizes Cantilever Springs.

Charles B. King, who designed the King cars, made by the King Motor Car Company, Detroit, drove his first horseless carriage in the streets of Detroit in 1894. This was produced from designs drawn by him the previous year. The latest King, model B, is characterized by the maker as a low priced car, but not cheap, and it is maintained that it represents sturdiness and perfect adjustment in every feature. Two bodies, a roadster and a five-passenger touring, are fitted to the single chassis.

The motor is a four-cylinder, L head unit, cast en bloc, with bore of 3.875 inches and stroke of five. Lubrication is by splash with pump circulation. Ignition is by a dual system with Briggs magneto and one set of plugs. The carburetor is a Stromberg. Cooling is by thermo-syphon, aided by a six-blade fan. The clutch is a multiple disc, faced with Raybestos. The selective transmission af-



fords three forward speeds and reverse. The wheelbase is 112 inches and the tires, 33 by four inches. A particular feature of the construction is the use of a cantilever rear spring suspension.

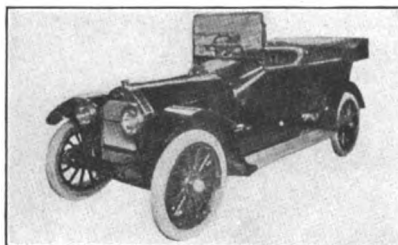
HERFF-BROOKS SIX.

This and a Four Made Their Debut at the Chicago Show.

Among the strictly new machines of the industry are the two Herff-Brooks models, which made their initial appearance during the recent Chicago show. They are made by the Herff-Brooks Corporation, Indianapolis, Ind., and are presented in four and six-cylinder types, both with roadster and touring car bodies.

The four is with an L head motor, cast en bloc, with bore of 4.125 inches and stroke of five. The crankshaft is carried on five bearings and the valves are completely enclosed. Lubrication is by splash, with gear pump circulation. The clutch is a leather faced cone, and the gearset has three forward speeds and reverse. The wheelbase is 116 inches and the tires are 34 by four inches.

The six-cylinder motor is also an L head type, with cylinders cast separately. The bore is four inches and the stroke 4.5. Except that the crankshaft is carried on seven bearings, the details of construction are the same as with the four. The wheelbase is 124 inches and the tires,



34 by four inches. Both models are completely equipped, including an electric lighting and motor starting system.

PREMIER WEIDELY.

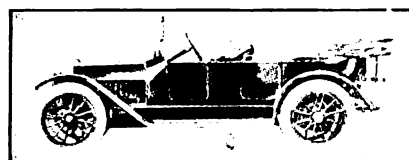
Employs New Type of Motor of the Valve-in-the-Head Design.

Inasmuch as the motoring public is unusually interested in new types of motors, those who visit the Boston show will not care to miss the new Weidely poppet valve motor, of the valve-in-the-head type, fitted to 1914 Premier cars, although the product of the Premier Motor Manufacturing Company, Indianapolis, Ind., is not new to New England. This is a six-cylinder engine, cast en bloc, and while the type is not new in itself, the application of the principle is a decided innovation. The camshaft is located directly above the ends of the valve stems, and a very light steel finger accomplishes the service usually performed by rocker arms. It is maintained that this construction makes for an exceptionally quiet motor, and one that is economical of fuel.

KISSELKAR 40.

Two Six-Cylinder Machines Also Included in This Maker's Line.

This is not the first year in which the KisselKar, made by the Kissel Motor Car Company, Hartford, Wis.,



has been displayed at Boston, but the line was not on view in 1913. It is anticipated that newer models than those described herein will be announced during the forthcoming show. At present, however, the line includes the 40, shown herewith, and two sixes, 48 and 60.

The motor of the 40 has bore of 4.5 inches and stroke of 5.25, which are the same as the dimensions for the 60. The 48 has motor with bore of 3.75 inches and stroke of 5.5. All models utilize a leather faced cone clutch and a four-speed selective transmission. The wheelbase of the 40 is 121 inches, that of the 48, 132 inches, and that of the 60, 142. The tires are 36 by four, 36 by 4.5 and 37 by five, respectively.

In body designs the KisselKar line is most complete, the 40 being equipped as a roadster, touring car and coupe; the 48 as semi-racer, touring car and limousine, and the 60 as roadster, touring car and limousine. All models are completely equipped.

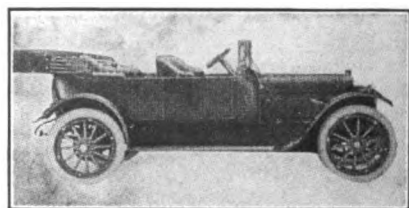
APPERSON 6-45.

Well Known Pioneer Manufacturer Adds a Six-Cylinder Model.

While Apperson cars, made by the Apperson Bros. Automobile Company, Kokomo, Ind., have been seen at previous Boston shows, they were not displayed a year ago, and this will be the first opportunity to view the new 6-45. The line also includes the 4-45, a four-cylinder model. The latter is fitted with roadster, touring, coupe and sedan bodies, while the former is presented in the roadster and touring types.

The motor on the new six is of the T head type, cast en bloc, with bore of 3.75 inches and stroke of 5.5. The clutch is a contracting band, and the selective gearset affords three forward speeds and reverse. The wheelbase is 120 inches for the roadster and 128 for the touring car. Tires are 36 by four inches.

The motor of the 4-45 has bore of 4.5 inch and stroke of five. The wheelbase is 120 inches and the tires 34 by four inches. The constructional details are the same.

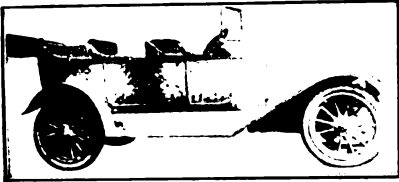


SHOWN FOR THE FIRST TIME THIS YEAR.

LENOX SIX.

Boston Concern Is Continuing This and the Four-Cylinder Model.

Unique in its position as the only automobile manufacturer with plant located in Boston, the Lenox Motor



Car Company naturally would be expected to take a prominent part in the annual Boston show. The product was designed to meet the requirements of New England people, and it has made its appeal very largely to the prospective purchasers in that district.

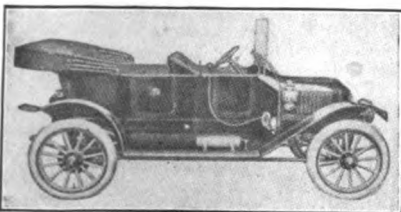
The line comprises a four and a six, and in the main these two chassis do not differ materially in design and construction. The four-cylinder motor has bore of 4.25 inches and stroke of 5.5, while the six has bore of four and stroke of five. The design follows standard practise throughout, with cone clutch and three-speed transmission. The wheelbase of the four is 118 inches and of the six, 130 inches. Tires are 36 by four and 36 by 4.5 inches, respectively.

STANLEY MODEL 710.

The Only Exponent of the Steam Vehicle at Any of the Shows.

Another maker that has been represented at practically all of the Boston shows is the Stanley Motor Carriage Company, Newton, Mass., maker of Stanley steam cars. There was a time when the steam machines were decidedly numerous at Boston shows, but during the past few seasons the field has been held exclusively by the Stanley, which has not been exhibited at any of the other big shows of the year.

The Stanley is made in three models, each with touring car bodies. The model 710, illustrated, has a two-cylinder, double-acting engine, with bore of four inches and stroke of five. The other engines are the same in design, but that of the model 607 has bore of 3.25 inches and stroke of 4.25, and that of the model 811, bore of 4.5 and stroke of 6.5. The wheelbases are: Model 607, 112 inches; 710, 120 and 811, 134. Tires are 32 by four, 36 by four and 36 by 4.5, respectively.



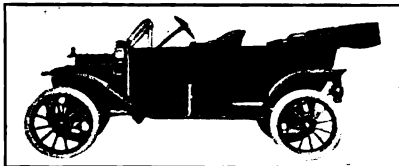
Model 710 is listed as a touring car, and with a roadster on the same chassis is known as model 712. Model 607 is a touring car, and as a roadster it is designated as model 606. Model 811 is listed as a seven-passenger touring car only, although commercial vehicle bodies are fitted to this same chassis.

FORD MODEL T.

The Universal Car Is Continued in Three Body Styles.

For some years, the only automobile display of national prominence in which Ford cars, made by the Ford Motor Company, Detroit, have been exhibited, has been the annual Boston show. During the 11 years in which this make of machine has been in the market, its general sale in all parts of the world has earned for it the title of the Universal car. For 1914 it is continued in three body styles, roadster, touring car and town car.

The motor is a four-cylinder unit of the L head type, cast en bloc, with bore of 3.75 inches and stroke of four. The clutch is a multiple disc, and the transmission a special Ford spur planetary type. The wheelbase is 100 inches and the tires are 30 by three inches forward and 30 by 3.5 rear.



The Ford must be regarded as a standardized car, in that the Ford company has not seen fit to make changes in design or construction. The line is almost too well known to require extended comment.

INTER-STATE.

Expected That Product of New Concern Will Be Disclosed.

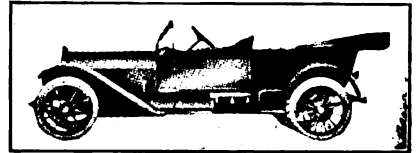
As noted elsewhere in this issue, the Inter-State Motor Company has been organized to take over the production of Inter-State cars, heretofore conducted by the Inter-State Automobile Company, Peru, Ind. It is stated that this new concern will produce an entirely new model, although nothing definite relative to this plan has been made public. It is anticipated that these new cars will be seen for the first time during the forthcoming display in Boston, which will be the initial appearance of Inter-State machines at a show this year.

In connection with the new models, it is understood the design which was prepared by the old concern for the 1914 season will be continued. Bore of four inches and stroke of five. This is with a six-cylinder motor of the L head type, cast en bloc, with the wheelbase is 132 inches, and the tires 36 by 4.5. This is produced with a five-passenger touring body.

MOYER MODEL G.

Maker Also Produces a Four-Cylinder Chassis with Three Bodies.

This is the fifth year that the Moyer cars have been on the market, and the second in which they have



been displayed at the Boston show. They are made in two chassis designs by H. A. Moyer, Syracuse, N. Y. The design and construction are similar with each. The six is fitted with touring and phaeton bodies, and the four with roadster, touring and phaeton.

Both motors are of the T head type, cast in pairs, with bore of 4.5 inches and stroke of five. The clutch is a cone, and the selective transmission affords three forward speeds and reverse. Special attention is directed to the spring suspension, the rear springs being fitted with equalizers at both ends, a method which is claimed to balance the load at all times. The wheelbase of the six is 135 inches, and the tires 35 by 4.5. The wheelbase of the four is 120 inches, and the tires 34 by four.

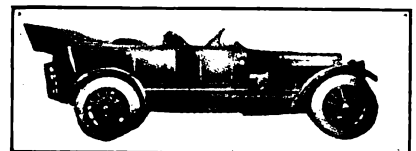
KNOX 46.

Well Known Pioneer Maker Is Featuring Prince Henry Body.

Practically ever since there was a Boston show, the Knox Automobile Company, Springfield, Mass., has been represented. This year it is the only display of national importance at which Knox cars will be shown. The company manufactures four models, 44 and 45, four-cylinder, and 46 and 66, six-cylinder. Particular attention is drawn to the model 46, or little six.

In the main, the design and construction have not been changed, and the principal feature is the fitting of a new body, termed the Prince Henry, this being of the streamline type. The motor is of the valve-in-the-head type, with cylinders cast in pairs. The bore is 4.375 inches and the stroke 5.5. The wheelbase is 134 inches and tires 38 by 5.5.

The Knox 44 and 45 are four-cylinder chassis with motor of five-inch bore and 5.5-inch stroke. The wheelbase of the former is optional, while that of the latter is 126 inches. The Knox 66, or big six, has motor of the same bore and stroke, and wheelbase of 134 inches. All Knox models have electric lighting and starting.

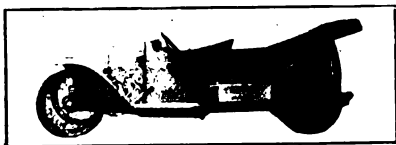


CYCLECARS MAKING THEIR BOSTON DEBUT.

TWOMBLY.

Utilizes Piston Valve Motor and Made in Two Body Styles.

The Twombly, made by the Twombly Car Corporation, New York City, with factories at Nutley, N. J., and



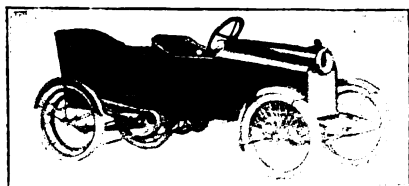
Sharon, Penn., is classed as a light car. It is made in two body designs, one a tandem two-seater and the other a delivery wagon. The wheelbase is 100 inches, the tread 38, and the weight about 600 pounds.

The motor is a special, Twombly silent piston valve type, with four cylinders cast en bloc, rated by the maker at 15 horsepower. This is water-cooled by the thermo-syphon system. The friction transmission is also of special design, termed a three-step, with two-speed drive shaft and single chain drive to the rear axle, thus affording six forward speeds and two in reverse. The wire wheels carry 28 by 2.5-inch tires. The equipment is very complete.

MERZ.

An Indianapolis Product Designed by Well Known Racing Driver.

The Merz, produced by the Merz Cyclecar Company, Indianapolis, Ind., is another true cyclecar, and it is of particular interest from the fact that it was designed by Charles Merz, well known as an automobile racing driver with National cars. Two body designs are offered, a tandem two-



seater and a parcel delivery wagon. The wheelbase is 84 inches and the tread 40.

The motor is a DeLuxe two-cylinder, air-cooled V type, with bore of 3.5 inches and stroke of 3.67. Drive is by shaft to a friction transmission, which provides four forward speeds and reverse, and thence by short V belt to the rear wheels. The wire wheels are fitted with 28 by three-inch tires.

A distinctive feature of the design lies in the use of a single headlight in the centre of the front, and almost flush with it. This front is a wire screen to allow free air circulation, and the screen, as well as the ventilation doors on the sides of the

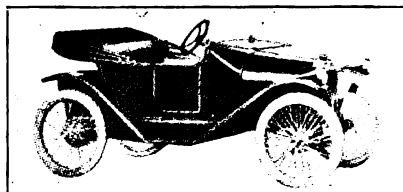
hood, is removable to permit easy access to the motor. It may be added that the transmission is composed of a friction wheel with a fibre surface contacting with a steel driving disc. The friction clutch is supported on a cross member about amidships.

TRUMBULL.

Friction Driven Model That Is Classified as a Light Car.

The Trumbull, made by the American Cyclecar Company, Bridgeport, Conn., is fitted with a four-cylinder motor of such dimensions as to place it in the light car class. It is produced as a two-passenger roadster, with seats arranged side by side, and has a wheelbase of 80 inches, tread of 44, and weight of approximately 650 pounds. The car comes completely equipped, this including motor starter, electric lights, electric horn, etc.

The motor is a water-cooled unit of the L head type, with mechanically operated valves and with bore of 2.875 inches and stroke of four. The friction transmission affords four forward speeds and reverse, and final drive is by roller chains. The wire



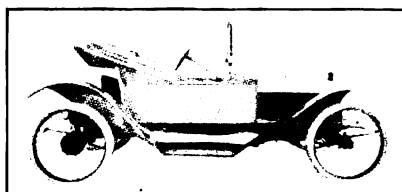
wheels, which are of a special patented design and demountable, are fitted with 28 by three-inch tires.

VICTOR.

Another Light Car Model, Designed as a Two-Passenger Roadster.

The Victor is the product of the Victor Motor Car Company, Philadelphia, Penn., and is produced as a two-passenger roadster, with seats side by side. The motor dimensions are such as to place it in the light car class. The wheelbase is 98 inches and the weight about 800 pounds.

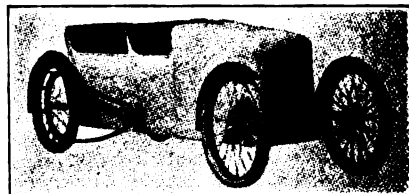
The motor is a four-cylinder, water-cooled, L head type, cast in pairs, with bore of 3.375 inches and stroke of 3.75. The clutch is a cone and the sliding gear transmission affords three forward speeds and reverse. Final drive is by shaft and bevel gear. The wire wheels are fitted with 30 by three-inch tires.



MERCURY.

A True Cyclecar Produced in Two-Passenger and Monocar Types.

The Mercury, made by the Mercury Cyclecar Company, Detroit, is a true cyclecar, with piston displacement



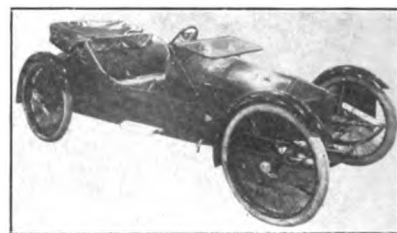
well within the limit set for such machines. It is produced in two body types, one providing for two passengers arranged tandem, and the other a monocar, a single-seated machine which is expected to make a direct appeal to business men. The wheelbase is 100 inches and the tread 36.

The motor is a DeLuxe, twin-cylinder, air-cooled V type, with bore and stroke of 3.5 inches. Power is transmitted by shaft and friction disc to a friction wheel on the countershaft, and thence by two V belts. Underslung springs are utilized both front and rear. The wire wheels carry 28 by 2.5-inch tires.

LAVIGNE.

Machine of the Light Car Type Fitted with Four Body Designs.

The LaVigne Cyclecar Company, Detroit, is producing the LaVigne, which comes under the light car classification of the Cyclecar Manufacturers National Association. It is provided with four body designs, a



two-passenger roadster, cabriolet, coupe and a parcel delivery wagon. Each of the pleasure vehicles is arranged to seat side by side. The wheelbase is 96 inches and the tread 50. The weight ranges from 650 pounds for the roadster to 800 for the delivery wagon.

The motor is a four-cylinder, air-cooled unit, cast en bloc, with bore of 2.375 inches and stroke of four. Power is transmitted by a sliding gearset affording two speeds forward and reverse, and shaft to a worm driven rear axle. The wire wheels are fitted with 30 by three-inch tires. Provision is made for starting from the seat.

RUSSELL-KNIGHT TEST.**Mea Magneto and Stromberg Carburetor Also Factors in Canadian Run.**

A 300-hour test of a Russell-Knight sleeve valve engine was completed in the laboratory of the University of Toronto, Ont., Feb. 10. This differed in a number of particulars from the 336-hour test to which the Moline-Knight engine was subjected in the laboratory of the Automobile Club of America in New York City the first of the year. It was started with a 24-hour run at 500 revolutions a minute, and this speed was increased 100 revolutions during each 24-hour period.

At the completion of the test the motor was completely disassembled and the following results are reported: The pistons, sleeves and cylinders were found to be round and true, and showed polish marks of perfect fitting. The exhaust ports of the cylinders were clear and clean. The exhaust ports of the sleeves showed about .03125 inch of carbon deposit on the edges. The piston heads had a slight carbon deposit around the edges, but tool marks were visible elsewhere. The cylinder heads were quite clean, small pieces of crust being in evidence here and there. The broad junk rings were well bedded in the sleeve walls. The bearings of the crankshaft, eccentric shaft, rods and wristpins were snug, and quite ready for car service. Most of the bearings bore a polish. The chain drive for the sleeves was slightly loose, but not in need of adjustment.

Throughout the test the Stromberg 1.75-inch carburetor was not adjusted, but was set with wide open throttle. The Mea magneto was changed with every increase in speed up to 1000 revolutions a minute, when its maximum advance was reached. Several spark plugs were changed.

PROTECTION FOR MOTORISTS.**Massachusetts Bonding & Insurance Company Presents Interesting Proposition.**

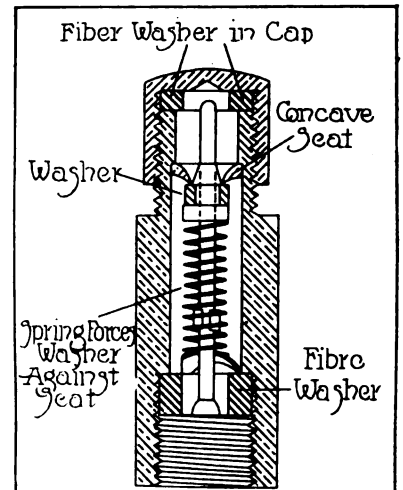
Motorists are endangered by the reckless use of highways, quite as much as pedestrians and others. Crowded traffic conditions often make it extremely difficult to avoid accidents of one kind or another. Most owners feel the need of the protection afforded by liability and property damage insurance.

The Massachusetts Bonding & Insurance Company, 77-85 State street, Boston, Mass., is directing special attention to its latest policy,

which has been described as 100 per cent. liability protection, and is particularly anxious to explain its features to automobile owners. Elsewhere in this issue will be found a coupon, which, if returned to the company properly filled out, will bring full details with reference to the individual car. T. J. Falvey is president of the company.

SMITH AIR VALVE.**Makes Easy the Pumping of Tires, Saving Both Time and Labor.**

The Smith Tire Valve Company, postoffice box 1965, Boston, is marketing the Smith easy pumping air valve, which is stated to require an almost imperceptible pressure to open in order to admit air into the inner tube of a pneumatic tire. It is designed to make easy the work of inflating shoes, and one of the qualities of it emphasized is that air is pumped into the tube from the beginning to the completion of the stroke of the pump. Ordinarily, the greater portion of the stroke is required to compress the air force open the conventional



Sectional View of Smith Easy Pumping Air Valve.

valve. The simplicity of the device is shown in an accompanying illustration. Not only does the Smith valve save time and labor, but it makes for tire economy in that its ease of operation insures that the owner will inflate the shoe to its proper pressure. It is a very compact device, being about an inch long and .375 in diameter. It is readily attached to the standard valve stem from which the cap and plunger are removed, as the Smith replaces these and performs their functions. The valves come in sets of five, are moderately priced, and are accompanied by a very liberal guarantee.

A movement is on foot looking toward a revival of the Fairmount Park road race, and the Philadelphia city councils have been asked for a permit to hold this classic during 1914.

HARTFORD DEALERS' DISPLAY.

Hold Seventh Annual Show in Park Casino Under Management of O. C. Wolfe.

The seventh annual show of the Hartford Automobile Dealers' Association, Hartford, Conn., was opened in the Park Casino, Feb. 21, for one week. The plans were somewhat different this year, since the list of exhibitors was limited to local dealers, which was made necessary by reason of the space available. The event was under the management of Owens C. Wolfe, assisted by the following committee: Bernard F. Smith, chairman; Herbert P. Seymour, Russell P. Taber, Lucius H. Elmer and Roger M. Spencer.

The color scheme was blue and white, and the treatment was colonial in character. The different spaces were set off by pillars surmounted by signs bearing the exhibitor's name, on top of which was perched an owl. The electrical display was particularly pleasing. The attendance throughout the early days of the week was such as to warrant the prediction of a new record, and dealers reported frequent sales. Among the exhibitors were the following:

Dillon Court Garage, Stutz; Buick Garage Company, Buick; Brown, Thomson & Co., Cadillac; Mfner Garage Company, Pierce-Arrow; Magna Automobile Company, Detroit electric; Universal Auto Company, Franklin; F. A. Law Machine Company, National; Edward Clark, Paige, Chandler; Palace Auto Service Company, Studebaker, Oldsmobile, Waverley electric; Packard Motor Car Company, Packard; George Knox, Peerless, Hudson; Russell Taber, Reo, Pullman; Capitol City Auto Company, Lozier; Pope Manufacturing Company, Pope-Hartford; Electric Auto Station, Ohio electric; W. H. Harris, Overland; R. N. Spencer, KisselKar; Stevens-Duryea Company, Stevens-Duryea; Elmer Automobile Company, Ford; J. N. Macdonald & Co., Velle; Chalmers Auto Agency, Chalmers; S. A. Foster & Co., Jeffery, White; F. F. Woolley, Baker electric; J. D. Parker, Hupmobile; Imperial Motor Car Company, Imperial, Grant; J. F. Trant, Imp cyclecar; Finch & Haynes, Henderson, Thor and Harley-Davidson motorcycles; Meyers Bros., Ivory novelties; Metz Auto Station, Metz; Chas. E. Miller, general line of accessories; A. N. Clark & Son, windshields; New England Garage Company, Chevrolet and J-M shock absorbers.

NEWARK'S BIGGEST SHOW.

Accessories Form Decidedly Important Section of Seventh Annual Display.

Outside of the shows in New York City, Chicago and Boston, probably no other display in this country this year will be able to make a record to compare with that of the accessory exhibitors at the seventh annual dealers' show in Newark, N. J., Feb. 21-28. There were 40 makes of pleasure cars and 19 of trucks on display, but the list of accessory exhibitors very nearly equalled both, there being 58 of them.

In many ways this exhibition was of decided

importance. Aside from the number of accessories on view, it was noticeable that several of the exhibits previously seen at the national shows in New York and Chicago were presented in their entirety. It is estimated that the value of the display was very close to \$1,000,000. Among the makes of cars on view were the following:

Pleasure cars—Marmon, National, Krit, Reo, Velle, Briscoe, Hudson, Jeffery, Studebaker, Hupmobile, Abbott-Detroit, Maxwell, Regal, Pathfinder, Havers, Pierce-Arrow, S. G. V., Simplex, Oakland, Haynes, Buick, Chalmers, Saxon, Kline-Kar, Winton, Cole, Stevens-Duryea, Cadillac, Peerless, Overland, Willys-Knight, Oldsmobile, Grant, Pullman, Mitchell and Paige. Cyclecars—Imp, Mercury, LaVigne, Rocket, Packet and Economy. Commercial vehicles—Buick, Walter, Morton, Peerless, Willys Utility, Adams, Velle, Pierce-Arrow, Koehler, Selden, Reo, Stewart and Garford.

NEW PLAN IN INDIANAPOLIS.

Dealers Hold Special Opening Week in Their Salesrooms Instead of Annual Show.

It probably was not due in any way to the fact that the worst flood in the history of Indianapolis took place last year during the progress of the annual show of the local dealers, but a new plan was tried this year and the results were so satisfactory in every way that it is possible that it will become an annual affair even though the show is renewed.

Beginning Feb. 21, each concern engaged in handling cars and accessories, inaugurated a special opening week, during which the salesrooms were decorated and the products arranged so as to call particular attention to their merits. Forty dealers, representing 55 different makes of cars in 180 models, took part in the event, which was a decided success from every viewpoint.

BIG RESULTS IN ST. LOUIS.

Spring Show Nets Dealers Taking Part Some \$500,000 in Sales of Cars.

Although a large number of the dealers in St. Louis, Mo., held an outdoor show last fall, conducted by the St. Louis Automobile Dealers' & Manufacturers' Association, the ninth annual spring exhibition in that city, which came to an end Feb. 26, was a decided success. Manager Frank Bishop reports that the dealers represented secured sales aggregating \$500,000.

Each of the exhibitors taking part was barred from the fall display. The spring show is to be conducted as in the past, but a movement is now on foot to hold a fall show in opposition to that conducted by the other body.

INSURANCE COST REDUCED.

Premiums Are 15 Per Cent. Less When Car Is Equipped with Pyrene Extinguisher.

Attention is again called to the recent action of several insurance companies in reducing the premiums on automobiles 15 per cent. where such cars are equipped with an approved fire extinguisher. This action is said to have been brought about through the efforts of the Pyrene Manufacturing Company, New York City, with branches in a number of cities, which markets the Pyrene fire extinguisher, shown herewith.



This extinguisher is of one quart capacity, 14 inches in length, three inches in diameter, and weighs but five pounds when filled and ready for use. It is said to be the only one of this capacity bearing the label of the Underwriters' Laboratories, Inc.

It comprises a cylindrical drawn brass tube, in which is a double acting, hand operated pump, designed to throw a stream of liquid at least 30 feet. The liquid is a compound of gases held to be devoid of moisture, acid, alkalis or salts, which, when thrown into a fire, is converted into a heavy, blanketing fire extinguishing gas.

It is maintained that the extinguisher preferably should be carried in a vertical position in a special vehicle bracket supplied for this purpose, on the dash or on one of the front doors. It is also stated that the compound will not freeze, even at temperatures as low as 60 degrees below zero, and that the container does not need to be recharged, except after actually having been used on a fire.

The Pyrene will be demonstrated at the forthcoming Boston show.

USED MILLER TIRES.

This Make Fitted to Joerman's Touraine, Fourth Place Car in Vanderbilt Race.

In addition to the accessories mentioned elsewhere as figuring prominently in the ninth race for the Vanderbilt Cup at Santa Monica, Cal., it is of interest to note that the tires used on Joerman's Touraine, which finished in fourth place, were of the Miller make, the product of the Miller Rubber Company, Akron, O. Miller tires hold the world's road racing record of 78.5 miles an hour, made over this course.

OMAHA SHOW OPENS.

Good Representation of Pleasure and Commercial Cars at Ninth Annual Display.

The ninth annual show of the Omaha Automobile Show Association was opened in the Auditorium, Omaha, Neb., under the management of Clarke G. Powell, secretary of the association, Feb. 23, for the entire week. The representation this year is much larger than heretofore, and included among the exhibits are a number of commercial vehicles. The success which has attended past efforts under the management of Mr. Powell, and the attendance during the opening days of the exhibition would seem to indicate a splendid season for the Omaha dealers. The list of exhibitors includes the following:

Pleasure Cars—Auburn Auto Company, Auburn; Apperson Jack Rabbit Auto Company, Apperson; Motor Car Sales Company, Abbott-Detroit; Nebraska-Buick Auto Company, Buick; Drummond Motor Company, Cole, Winston, Woods electric; Cadillac Company of Omaha, Cadillac; Cartercar-Nebraska Company, Cartercar, Metz; Doty & Hathaway, Chevrolet, Reo; Stewart-Toozzer Motor Company, Chalmers, Pierce-Arrow; W. L. Huffman Auto Company, Chandler, Hupmobile; T. G. Northwall Company, Detroit, Regal; Andrew Murphy & Son, Detroit electric; Empire Auto Company, Empire; Ford Motor Company, Ford; T. H. Pollock, Henderson; Guy L. Smith, Hudson; Inter-State Auto Company, Inter-State; Bradley, Merriam & Smith, Imperial; Rambler Motor Company, Jeffery; Pioneer Implement Company, Jackson, Richmond; Oppen-Van Fleet Auto Company, Kissel-Kar, Krit; Drummond Motor Company, Locomobile; Mitchell Motor Company, Mitchell, Lozier; Maxwell Motor Sales Corporation, Maxwell; Moline Auto Company, Moline-Knight; Marlon Auto Company, Marlon, Marmon; Traynor Auto Company, National, Partin-Palmer; Van Brunt Auto Company, Overland, Ohio electric; Lininger Implement Company, Oakland; Orr Motor Sales Company, Packard; Paige Company of Nebraska, Paige; Electric Garage Company, Rauch & Lang electric; E. R. Wilson Auto Company, Studebaker; R. N. Howes & Co., Stevens-Duryea; Freeland Auto Company, Spaulding; Wm. Pfeiffer, Speedwell; John Deere Plow Company, Velle; H. Pelton, White.

Commercial Vehicles—Avery Company, Avery; Nebraska Buick Auto Company, Buick; International Harvester Company, I. H. C.; Andrew Murphy & Son, Kelly; Orr Motor Sales Company, Packard; E. R. Wilson Auto Company, Studebaker; Wm. Pfeiffer, Speedwell; H. Pelton, White; Van Brunt Auto Company, Willys Utility.



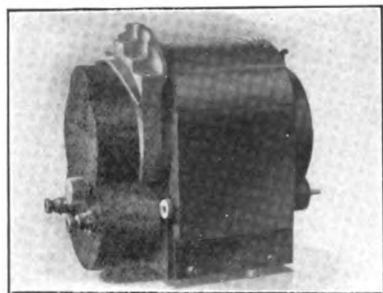
Clarke G. Powell, Manager, Omaha Automobile Show.

MAGNETO CARE AND ATTENTION.

The Work Necessary to Maintenance, Continued Service and Efficiency Described and Illustrated---Directions for Timing and Installations on 1914 Cars.

(By C. P. Shattuck.)

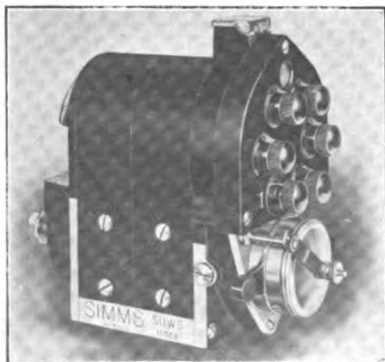
WITH the manufacturer enlarging upon the refinements and equipment of his 1914 model, the ignition system is generally overlooked by the prospective purchaser, and this is but natural, as the reliability of the magneto has been conceded for some years past. Improvements, however, are noted, these including en-



Briggs Model C Magneto.

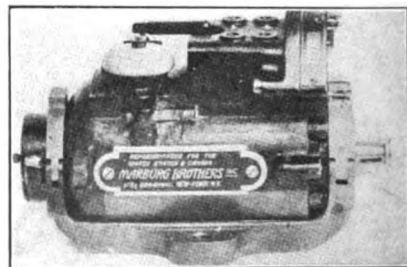
closed construction, preventing the entrance of moisture and foreign elements; the production of a hotter spark at low rotational speeds, and quicker acting interrupter mechanism. These features make for increased efficiency, and obviously the magneto requires less attention than formerly.

A review of the 1914 ignition systems reveals marked tendency toward single ignition, due to the general adoption of the motor starter, which relieves the owner of cranking and the necessity of auxiliary or battery



Simms S U W Six Magneto.

classified under two general heads, low-tension and high-tension. The armature of the latter carries a primary and a secondary winding and no induction coil is required as is the case with the low-tension instrument, but with some types of true high-tension magnetos, a second or independent breaker mechanism is incorporated to interrupt the battery



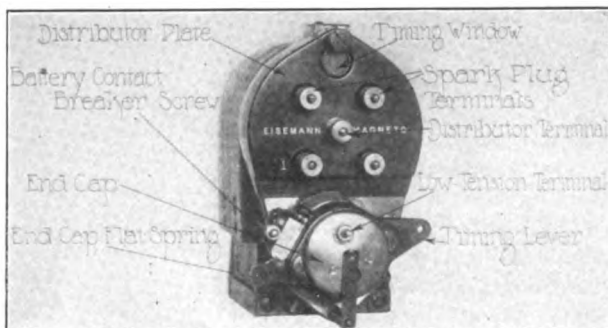
The Men Magneto, Type B H 4, Employing Bell Shaped Magnets.

current as with the Bosch, Eisemann and Simms for example.

The maximum efficiency or hottest spark is obtained from a magneto when its armature is in a certain position or when the greatest number of lines of magnetic force are cut, and as the primary current must be interrupted to induce a high-tension current in the secondary winding, it will be seen

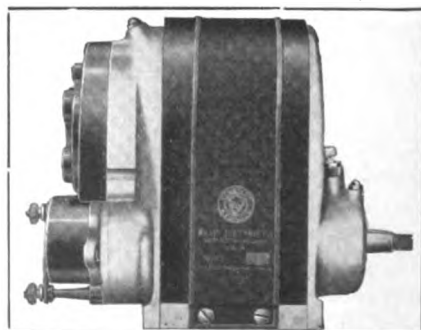
that the time of breaking of the low-tension current is a most important factor. This breaking of the low-tension current is accomplished by the interrupter mechanism, which is generally attached to and revolves with the armature shaft.

New owners are sometimes advised to leave the magneto alone, and consequently regard it as



Eisemann E M Dual Magneto with Exterior Components Lettered.

ignition for starting. Dual ignition (magneto and battery) is, however, to be found on many 1914 cars, and it is the exception rather than the rule that two sets of spark plugs are used. Magnetos are



Model P Remy Magneto.

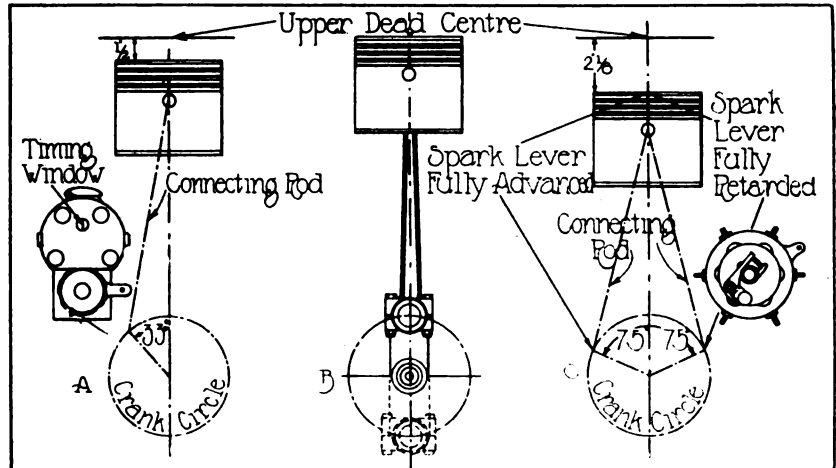
a delicate mechanism requiring the services of an expert to clean and adjust. While it is not probable that it will need frequent attention, the writer advocates an inspection of the interrupter mechanism from time to time, for after continued service it may be that the gap between the contact points has increased, affecting the efficiency of the motor.

There are three things the owners can do to obtain maximum efficiency from the magneto. These are: Clean, adjust and lubricate, and the work should be done according to the instructions of the maker. Provision is made for maintaining the proper gap between the contact points, an adjustable screw permitting of decreasing the space caused by wear, etc. Each maker supplies a wrench with gauge attached for determining the space between the points, and the operation of setting is easily performed.

Particular attention is called to the illustrations at Figs. 13 to 15 inclusive, as these not only show the interrupter mechanism, but depict its operation. Figs. 16, 17, 20 and 21 show the method of using a wrench and making adjustments, while Figs. 18 and 28 illustrate the use of the gauge. These and other illustrations show the progressive steps of removing, adjusting and cleaning the magneto, and as each step is explained the novice should, with a little study, be able to care for the magneto.

In timing or setting the magneto the exact location of the piston for the firing position is determined by the engineers of the maker of the car, and there are two methods, one by the position of the piston and the other by the flywheel or crank circle. With four-cylinder, four-cycle

motors the shaft rotating the magneto armature is driven at crankshaft speed and at one one-half times crankshaft speed with six-cylinder

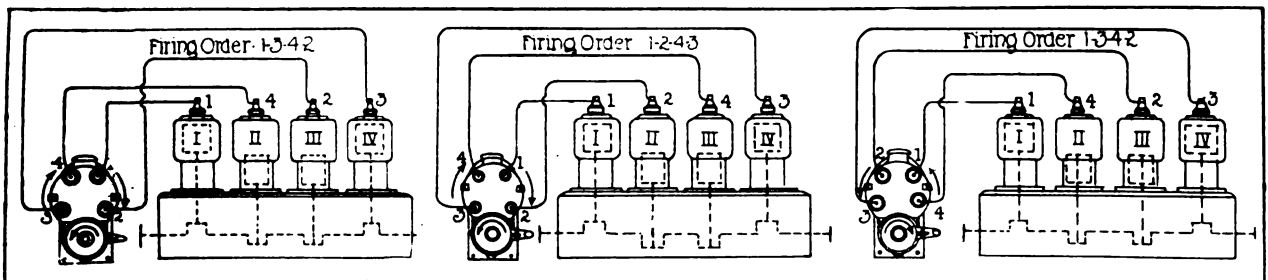


Timing Diagrams, Showing Positions of Crank and Piston for Magneto Setting: A, Piston 1/2 Inch Before Top Dead Centre, Corresponding to 33 Degrees Crank Circle; B, Piston at Top Dead Centre, or Completion of Compression Stroke; C, Location of Piston with Spark Lever Fully Advanced and Retarded for Battery, Commutator and Coil Ignition.

units. In connecting the driving member to the armature shaft in the event the magneto has been displaced from its base, for example, the coupling is made so that the break and spark will take place as determined by the designer of the motor.

With magnetos having timing windows or indicators, the setting is simplified. With the Bosch ZR4 and ZR6, for example, the armature shaft is rotated in its proper direction until the figure "1" is discernible through the timing window, and further revolved until the marked distributor tooth registers with marks on the side of the sight hole exposed by lifting the cover to the oil well. Several makers incorporate the timing indicator in their product. When not used the magneto will have to be set by the break of the points.

Previous to setting the magneto the time of spark in the first cylinder must be determined. It varies according to the design of the motor,



Wiring Diagrams of Four-Cylinder Magnetos: At Left, Magneto Running Clockwise and Firing Sequence 1-3-4-2; Centre, Armature Rotating Clockwise and Firing Sequence 1-2-4-3; at Right, Magneto Running Anti-Clockwise and Firing Sequence 1-3-4-2—It Should Be Borne in Mind That the Rotation of the Distributor Is Opposite to That of the Armature Shaft.

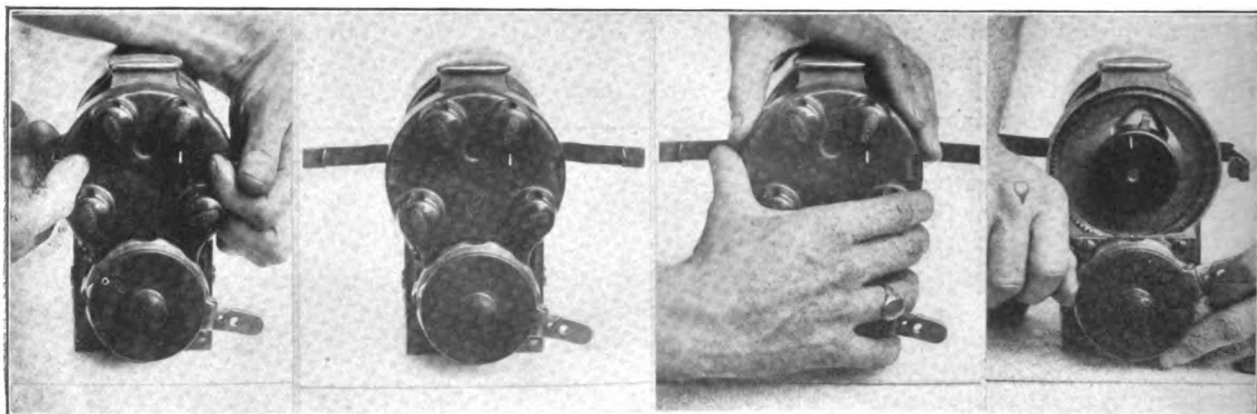


Fig. 1—Bosch ZR4: The Distributor Plate Is Retained by Two Holding Springs—Push Outward.

Fig. 2—Holding Springs Displaced and Distributor Plate Ready to Be Removed from Magneto.

Fig. 3—Grasp Distributor Plate, Pull Directly Forward, Place Carefully to One Side for Inspection.

Fig. 4—The Interrupter Housing Is Held by a Snap Ring and Is Removed as Shown.

but as the setting and firing order of the 1914 models are given herein it should be a simple matter. It will be noted that there are three general piston locations given: Before top dead centre, dead centre and past dead centre. Centre is referred to as the completion of the compression stroke, and as the majority of flywheels are marked, the work is simplified. An accompanying timing diagram shows the location of the piston both by its travel in inches and degrees of the crank circle.

It will also be seen that reference is made to the position of the magneto timing lever, and in some instances it is fully advanced and in others fully retarded. These points may be determined easily by noting the direction of rotation of the armature shaft and break of the points, or operating the hand spark lever. For example: Fig. 4 shows a magneto driven clockwise (looking at the driving end) and the timing lever fully retarded. Fig. 1 depicts the lever fully advanced,

thereby causing an earlier break of the contact points. Relative to the "points just beginning to break", Fig. 14 shows the contact block touching the segment and the points separating.

If for any reason the secondary cables are displaced, a knowledge of the firing order of the motor and the direction of rotation of the distributor gear of the magneto will be necessary. If it is borne in mind that the distributor rotates in a direction opposite to that of the armature shaft, and that the cables are connected according to the firing order of the cylinders, no trouble should be experienced. Accompanying wiring diagrams show how to properly connect the secondary cables with four and six-cylinder magnetos and the various firing sequences are also given.

The writer is indebted to the engineering departments of the manufacturing concerns producing 1914 models listed herein for the data on magneto timing and the firing order of the motors presented in detail in the succeeding pages:

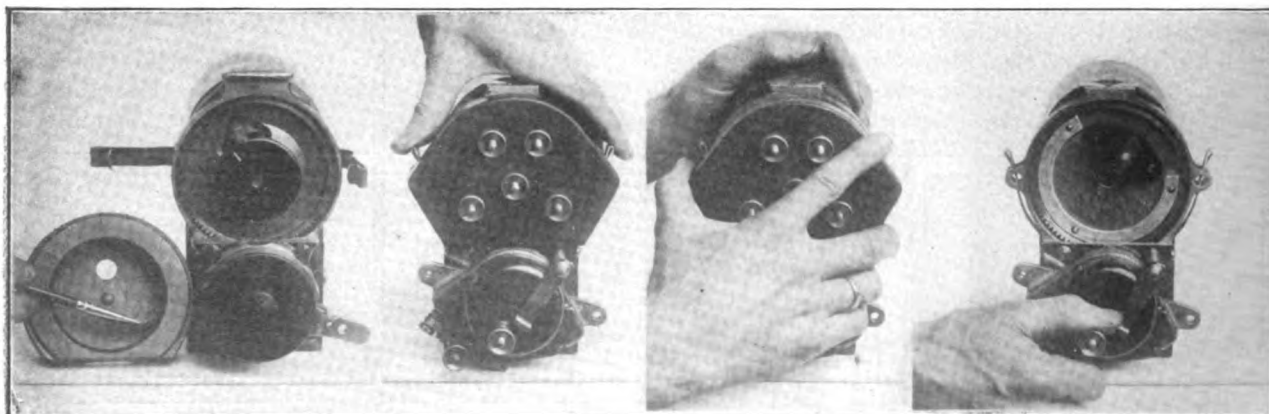


Fig. 9—Carbon Dust May Be Removed from Distributor with Brush Moistened with Gasoline.

Fig. 10—Bosch Dual: Compress Holding Springs by Moving Inward Until They Clear Plate Studs.

Fig. 11—Grasp Plate Firmly, Pull It Directly Forward and Place to One Side for Cleaning.

Fig. 12—To Remove End Cap or Cover, Push Holding Spring to the Right Until It Clears.

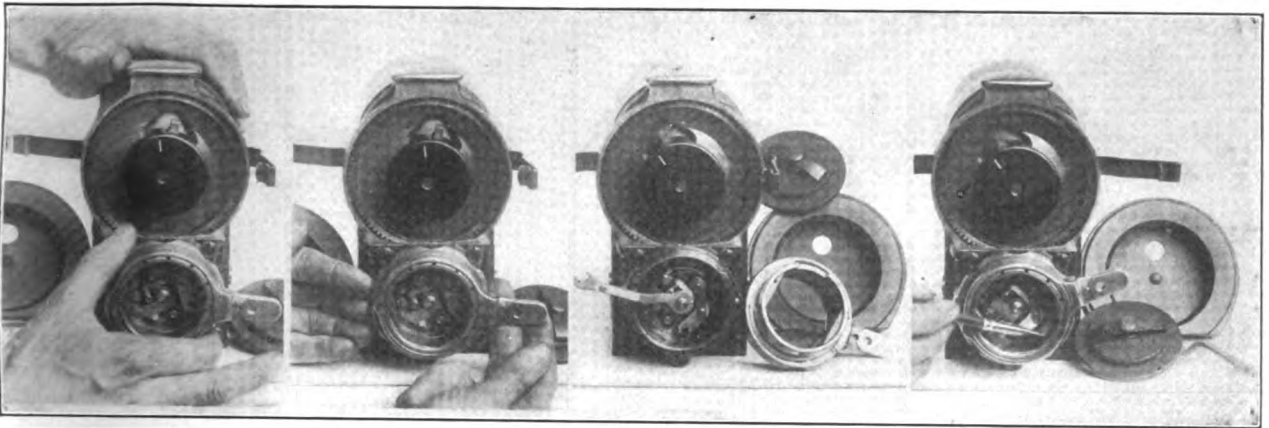


Fig. 5—To Unlock Rotate Lock Nut Until Its Red Slot Registers with a Similar Mark.

Fig. 6—The Complete Housing Is Displaced by Pulling It Directly Forward as Shown.

Fig. 7—To Remove Interrupter, Loosen Fastening Screw with Wrench and Take Out the Screw.

Fig. 8—A Dry, Soft Brush Is Best for Cleaning the Interrupter Mechanism, Which Is Not Lubricated.

ABBOTT-DETROIT.

34-40 and 44-50—Firing Order 1-3-4-2.

Belle Isle—Firing Order 1-5-3-6-2-4.

Magneto Setting—Piston dead centre, lever fully retarded. Full advance, spark occurs with crankshaft 13 degrees ahead of dead centre. Contact point gap .018 inch.

ALLEN.

40—Firing Order 1-2-4-3.

Magneto Setting—Piston top dead centre, lever fully retarded.

AMERICAN.

Scout—Firing Order 1-3-4-2.

644, 646 and 666—Firing Order 1-5-3-6-2-4.

Magneto Setting—Three-quarter inch after dead centre on flywheel.

ARBENZ.

Firing Order 1-3-4-2.

Magneto Setting—Piston .03125 inch late, lever fully retarded.

AUBURN.

4-40 and 4-41—Firing Order 1-3-4-2.

Magneto Setting—Piston .03125 inch late, lever fully retarded.

6-46 and 6-45—Firing Order 1-4-2-6-3-5.

Magneto Setting—Piston top dead centre, lever fully retarded.

BUICK.

B 24, 25, 36, 37 and 38—Firing Order 1-3-4-2.

Delco—With timer cam fully retarded, spark occurs 40 degrees past upper dead centre on firing stroke. With hand spark lever half-way advanced, spark occurs at

approximately top dead centre.

B 55—Firing Order 1-4-2-6-3-5.

Delco—Piston dead centre with timer fully retarded.

CADILLAC.

Firing Order 1-2-4-3.

Delco—Changes being made in system.

CAMERON.

30—Firing Order 1-3-4-2.

Magneto Setting—Points break with piston on top dead centre, lever fully retarded.

CARTERCAR.

5 and 7—Firing Order 1-3-4-2.

Magneto Setting—Piston dead centre. Magneto and spark lever half-way advanced.

CASE.

25 R and 35 S—Firing Order 1-3-4-2.

Magneto Setting—One thirty-second inch before top dead centre.

40 O—Firing Order 1-3-4-2.

Magneto Setting—One-sixteenth inch after top dead centre.

CHADWICK.

A—Firing Order 1-3-2-6-4-5.

Magneto Setting—From .75 inch before to .25 inch after top dead centre. (Piston.)

CHALMERS.

24—Firing Order 1-4-2-6-3-5.

Magneto Setting—One and one-half inches past centre, lever fully retarded.

CHANDLER.

Six—Firing Order 1-5-3-6-2-4.

Magneto Setting—Piston dead centre, lever fully retarded.

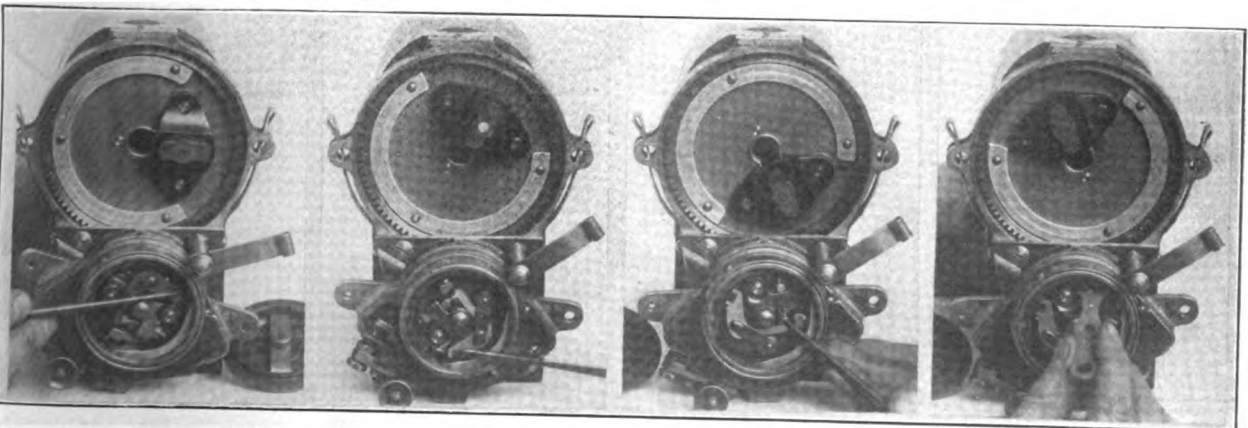


Fig. 13—Fibre Block Which Breaks Contact Points, Which Are Shown in Their Normal Position.

Fig. 14—Block Making Contact with Segment, Platinum Points Just Beginning to Break.

Fig. 15—Contact Points Fully Separated—Positions for Adjusting and Measuring with Gauge.

Fig. 16—Loosen Lock Screw with Wrench, Turning to Left—Do Not Exert Uneven Pressure.

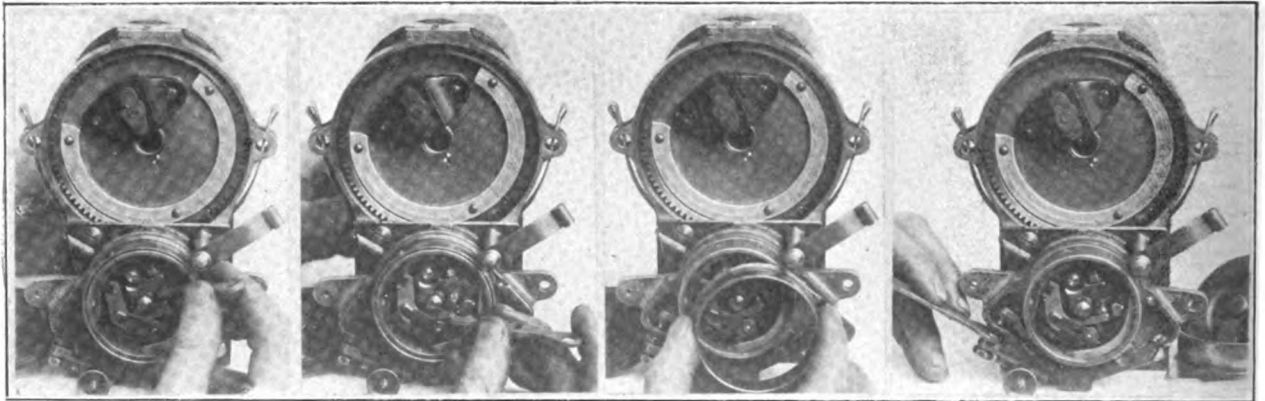


Fig. 17—Turn Nut to Right or Left to Decrease or Increase Gap, and Tighten Lock Nut Carefully.

Fig. 18—Insert Gauge Between Fully Separated Points—A Snug Fit Indicates the Proper Break.

Fig. 19—Battery Interrupter Mechanism Is Exposed by Pulling Forward Its Housing.

Fig. 20—To Adjust Points, Loosen Locking Nut with Wrench, Turn Screw and Tighten Locking Nut.

CHEVROLET.

Baby Grand and Royal Mail—Firing Order 1-2-4-3.
Magneto Setting—Piston dead centre.

L—Firing Order 1-4-2-6-3-5.
Magneto Setting—Piston dead centre.

COLE.

Four—Firing Order 1-3-4-2.

Six—Firing Order 1-5-3-6-2-4.
Delco—Piston dead centre, distributor fully retarded.

CONTINENTAL.

27—Firing Order 1-3-4-2.

Magneto Setting—Three-quarter inch after dead centre on flywheel.

CRANE.

4—Firing Order 1-4-2-6-3-5.

Magneto Setting—Full advance is 25 degrees early.

CRESCENT.

Ohio—Firing Order 1-3-4-2.

Magneto Setting—Ten degrees (flywheel) after top dead centre.

Royal—Firing Order 1-5-3-6-2-4.

Magneto Setting—Piston .03125 inch after top dead centre, lever fully retarded.

CROW ELK-HART.

D 42, 45, 52, 54, 55 and 56—Firing Order 1-3-4-2.

Magneto Setting—Piston dead centre, lever fully retarded.

DETROITER.

A—Firing Order 1-2-4-3.

Magneto Setting—Two and one-half degrees after top dead centre.

DISPATCH.

Firing Order 1-3-4-2.

Magneto Setting—Piston dead centre, lever fully retarded.

DORRIS.

1—Firing Order 1-3-4-2.

Magneto Setting—From 30 degrees late to five early.

DURYEA.

Two-Cylinder.

Piston dead centre, timer fully retarded.

EMPIRE.

31—Firing Order 1-3-4-2.

Magneto Setting—About .3125 inch advance to the piston travel. Fixed spark.

ENGER.

Firing Order 1-3-4-2.

Magneto Setting—Crankshaft dead centre.

FAL.

Firing Order 1-3-4-2.

Magneto Setting—Piston dead centre, lever fully retarded.

FIRESTONE-COLUMBUS.

69 D, 60 E and 86 E—Firing Order 1-3-4-2.

Magneto Setting—Piston dead centre, lever fully retarded.

90 E—Firing Order 1-5-3-6-2-4.

Magneto Setting—Piston dead centre, lever fully retarded.

FRANKLIN.

6-30—Firing Order 1-4-2-6-3-5.

Magneto Setting—One and one-half inches before dead centre or 9.5 degrees (flywheel), lever fully retarded.

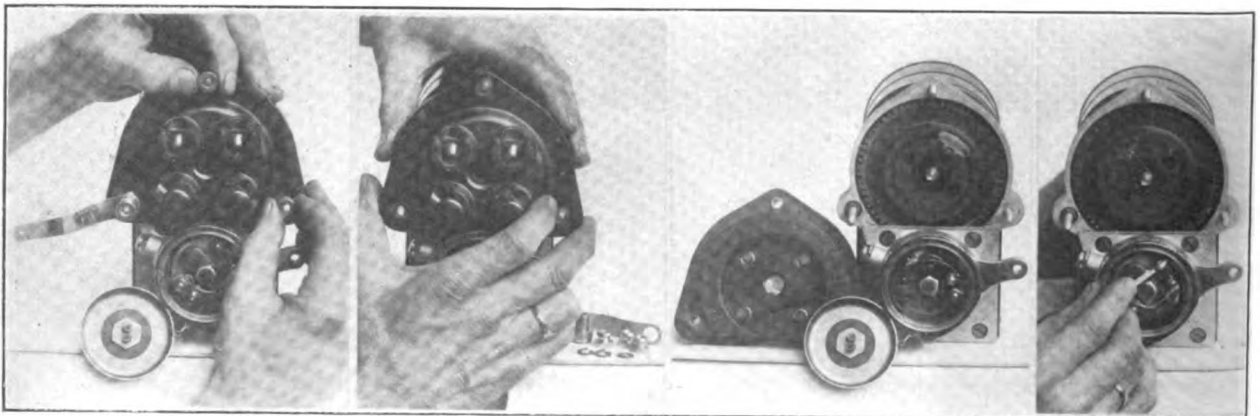


Fig. 25—Unscrew, Displace Knurled Nuts, Washers and Spring Holding Interrupter Cover or Cap.

Fig. 26—By Exerting an Even Pressure and Pulling Forward, the Distributor Plate Is Removed.

Fig. 27—End Cap and Plate Removed, Also Showing the Carbon Brushes and the Indicating Window.

Fig. 28—The Adjustable Contact Screw Has Two Lock Nuts and Both Must Be Loosened.

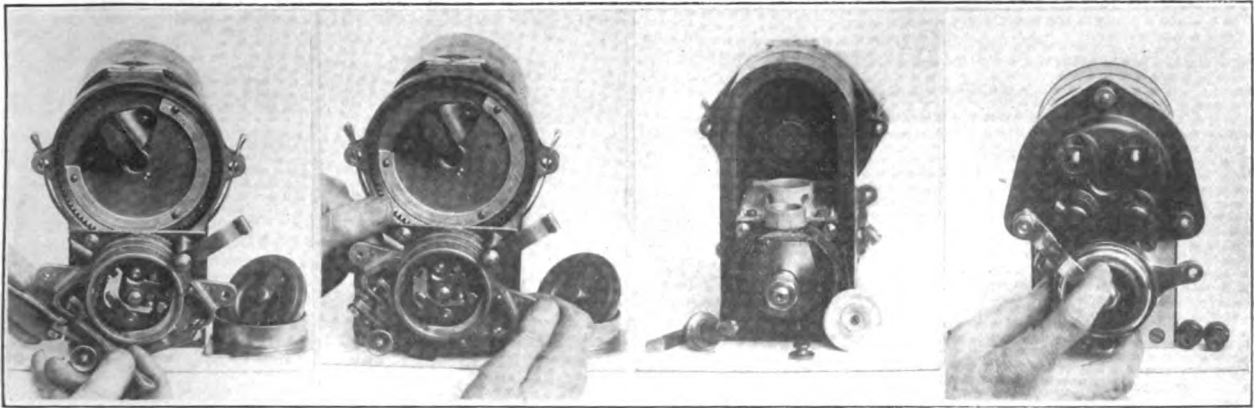


Fig. 21—Test Gap with Wrench Gauge and Tighten the Locking Nut on the Adjustable Screw.

Fig. 22—The Battery Interrupter Mechanism Is Removable by Pulling It Forward as Shown.

Fig. 23—Carbon Brush Is Displaced by Removing Nut, Spring, Knurled Nut and Unscrewing Holder.

Fig. 24—Splittorf EU4: To Remove End Cap, Slip Flat Spring to Extreme Left and Displace Cover.

GLIDE.

36 and 30—Firing Order 1-3-4-2.
Westinghouse—Piston top dead centre.

GRANT.

M—Firing Order 1-3-4-2.
Magneto Setting—Lever fully advanced, piston .3125 inch before top dead centre.

GREAT SOUTHERN.

50—Firing Order 1-3-4-2.
Magneto Setting—Piston dead centre.

HAYNES.

28—Firing Order 1-3-4-2.
Magneto Setting—One sixty-fourth inch advanced on down stroke.

26 and 27—Firing Order 1-4-2-6-3-5.
Magneto Setting—One sixty-fourth inch advanced on down stroke.

HENDERSON.

De Luxe—Firing Order 1-3-4-2.
Magneto Setting—Points break .75 inch before dead centre, lever fully retarded. Battery side breaks .75 inch after dead centre, fully retarded.

Six—Firing Order 1-5-3-6-2-4.
Magneto Setting—Points break 1.5 inches before dead centre. Battery side breaks on dead centre.

HUDSON.

6-40 and 6-54—Firing Order 1-5-3-6-2-4.

HUPMOBILE.

32—Firing Order 1-2-4-3.
Magneto Setting—Piston dead centre, lever fully retarded.

IMPERIAL.

34 F B, 32 and 34 M—Firing Order 1-2-4-3.
54 and 44-6—Firing Order 1-5-3-6-2-4.
Magneto Setting—Points break with piston on dead centre.

INTER-STATE.

45—Firing Order 1-5-3-6-2-4.

JACKSON.

Majestic and Olympic—Firing Order 1-3-4-2.
Magneto Setting—Piston .125 inch before top centre.

Sultanic—Firing Order 1-5-3-6-2-4.

Magneto Setting—Piston .125 inch before top centre.

JEFFERY.

93—Firing Order 1-3-4-2.

96—Firing Order 1-4-2-6-3-5.

Magneto Setting—Piston dead centre, lever fully retarded.

KEETON.

F—Firing Order 1-5-3-6-2-4.

Magneto Setting—Points break 6.5 degrees before centre.

KING.

B—Firing Order 1-3-4-2.

Magneto Setting—Points break with lever fully retarded from centre to .5 inch past on flywheel.

KLINE-KAR.

4-30—Firing Order 1-2-4-3.

Magneto Setting—Three-eighths inch before firing centre.

4-40—Firing Order 1-2-4-3.

Magneto Setting—Nine-sixteenths inch before firing centre.

6-60—Firing Order 1-4-2-6-3-5.

Magneto Setting—Nine-sixteenths inch before firing centre.

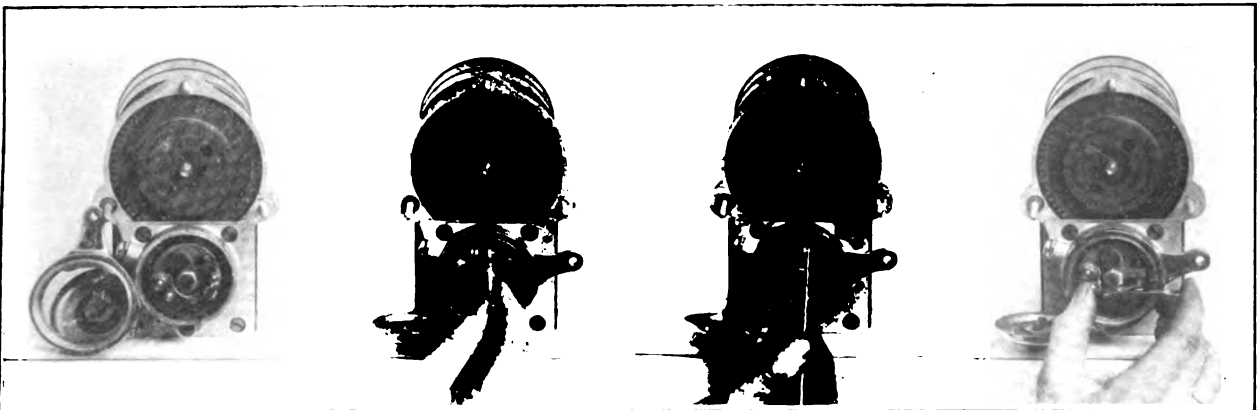


Fig. 29—Interrupter Housing Is Removable, Permitting Easy Access to the Breaker Mechanism.

Fig. 30—Turn Adjusting Nut to Right or Left to Increase or Decrease Gap and Tighten Lock Nuts.

Fig. 31—Platinum Points Are Trued and Cleaned with a Fine Jeweller's File and Must Be Even.

Fig. 32—Contact Points Should Be Fully Separated When Using Gauge to Determine Proper Gap.

KNOX.

44 and 45—Firing Order 1-3-4-2.

Magneto Setting—Piston .75 inch before top centre, lever fully retarded. Battery, piston .375 inch before top centre.

KRIT.

L—Firing Order 1-3-4-2.

Magneto Setting—Piston .125 inch before top dead centre, lever fully retarded.

LEWIS.

Six—Firing Order 1-5-3-6-2-4.

Magneto Setting—Piston top dead centre, lever fully retarded. Full advance equals .234375 inch of piston stroke.

LOCOMOBILE.

48 LD and RD, 38 RD and LD—Firing Order 1-5-3-6-2-4. Magneto Setting—Three-eighths to .4375 inch before top dead centre, lever fully advanced.

LOZIER.

Four—Firing Order 1-3-4-2.

77—Firing Order 1-4-2-6-3-5.

Magneto Setting—Piston dead centre, lever fully retarded.

LYONS-KNIGHT.

K4—Firing Order 1-3-4-2.

Magneto has six-inch range on 20-inch flywheel from one inch past centre to five inches before.

MARION.

B—Firing Order 1-3-4-2.

Magneto Setting—Piston .03125 inch after dead centre.

G—Firing Order 1-5-3-6-2-4.

Magneto Setting—Piston .03125 inch after dead centre.

MASON.

Firing Order 1-3-4-2.

Six—Firing Order 1-5-3-6-2-4.

Magneto Setting—Piston .125 inch before top dead centre, lever fully retarded.

NORWALK.

C and D—Firing Order 1-4-2-6-3-5.

Atwater Kent—Piston .093 inch past centre with distributor set at retard.

OLDSMOBILE.

54—Firing Order 1-5-3-6-2-4.

Delco—Spark occurs at piston dead centre with hand spark lever fully retarded or .390625 before dead centre with lever fully advanced.

OVERLAND.

79—Firing Order 1-3-4-2.

Magneto Setting—One and one-quarter inches after dead centre (flywheel), lever fully retarded.

PACKARD.

2-38—Firing Order 1-4-2-6-3-5.

Magneto Setting—Piston .5 inch before top centre, lever fully advanced.

PAIGE.

25 and 36—Firing Order 1-3-4-2.

Magneto Setting—Place No. 4 piston on top dead centre (Compression stroke). Points should just begin to break.

PALMER-SINGER.

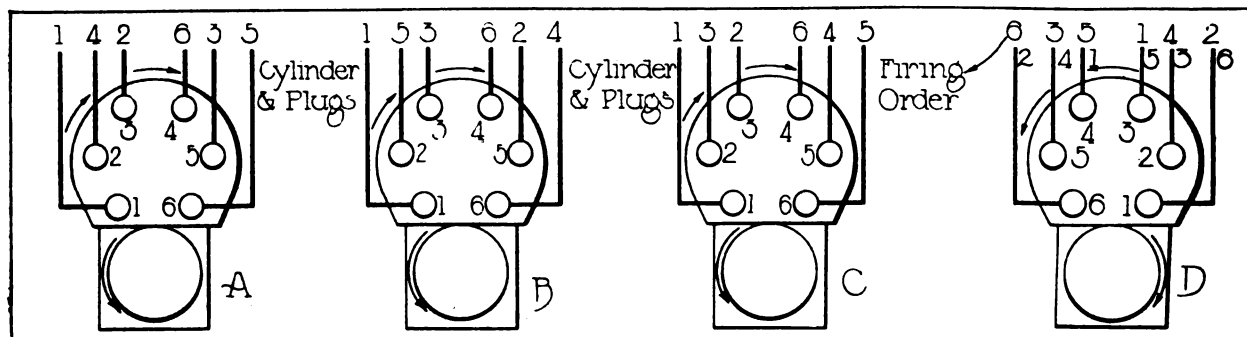
L Brighton 6—Firing Order 1-4-2-6-3-5.

Magneto Setting—Twelve degrees early (flywheel) lever fully retarded. Battery, dead centre.

PARTIN-PALMER.

38—Firing Order 1-2-4-3.

Magneto Setting—Piston dead centre, lever fully retarded.



Wiring Diagrams of Six-Cylinder Magnetos: A, Magneto Running Clockwise and Firing Sequence 1-4-2-6-3-5; B, Armature Rotating Clockwise and Firing Sequence 1-5-3-6-2-4; C, Same Direction with Firing Sequence 1-3-2-6-4-5; D, Magneto Running Anti-Clockwise and Firing Sequence 6-3-5-1-4-2.

Magneto Setting—Points break with piston on dead centre.

MAXWELL.

25-4 and 35-4—Firing Order 1-3-4-2.

50-6—Firing Order 1-4-2-6-3-5.

Magneto Setting—Points break with piston on dead centre, lever fully retarded.

McFARLAN.

64-T—Firing Order 1-5-3-6-2-4.

Magneto Setting—Five degrees past dead centre (flywheel) with lever fully retarded with Mea magneto. Dead centre and full retard with Bosch or Elsemann.

MOLINE-KNIGHT.

26-50—Firing Order 1-3-4-2.

Magneto Setting—Piston top dead centre.

MOON.

42—Firing Order 1-3-4-2.

6-50—Firing Order 1-5-3-6-2-4.

Delco—Spark breaks on centre in retarded position.

MORSE.

D—Firing Order 1-3-4-2.

Magneto Setting—Piston top dead centre, lever fully retarded.

MOYER.

E—Firing Order 1-3-4-2.

G—Firing Order 1-5-3-6-2-4.

Magneto Setting—Piston .375 inch after dead centre.

NATIONAL.

40—Firing Order 1-3-4-2.

Magneto Setting—Piston .0625 inch past top dead centre, lever fully retarded.

PATHFINDER.

Sixes—Firing Order 1-5-3-6-2-4.

Magneto Setting—One inch late.

PEERLESS.

38-6, 48-6 and 60-6. Firing Order 1-4-2-6-3-5.

Magneto Setting—At full retard, 7.5 degrees past dead centre (flywheel), full advance, 15.8 degrees before dead centre.

PIERCE-ARROW.

Sixes—Firing Order 1-5-3-6-2-4.

Magneto Setting—Magnet mark on flywheel should be 4.8125 inches ahead of 1 and 6 top centre and 1 showing in timing window. Piston is .5 inch before top dead centre or 33 degrees of crank circle. Battery spark occurs with piston 2.125 inches before top dead centre or 75 degrees of crank circle with spark lever fully advanced.

PILOT.

50—Firing Order 1-3-4-2.

60—Firing Order 1-5-3-6-2-4.

Magneto Setting—Points break with lever fully retarded and piston on dead centre.

POPE-HARTFORD.

35—Firing Order 1-2-4-3.

Magneto Setting—Piston top dead centre. Maximum advance of magneto .5 inch on piston travel.

PREMIER.

6-48 and Weldely—Firing Order 1-4-2-6-3-5.

Magneto Setting—Piston dead centre, lever fully retarded.

REGAL.

C, T, N and NC—Firing Order 1-2-4-3.
Magnetto Setting—Piston top dead centre, lever fully retarded.

REO.

Fifth—Firing Order 1-3-4-2.
Remy System—Piston top dead centre when indexing button on distributor engages.

RICHMOND.

R and S—Firing Order 1-3-4-2.
T—Firing Order 1-5-3-6-2-4.
Magnetto Setting—Piston top dead centre, lever fully retarded.

SAXON.

A—Firing Order 1-3-4-2.
Atwater Kent—Piston dead centre, distributor fully retarded.

SIMPLEX.

38 and 50—Firing Order 1-3-4-2.
Magnetto Setting—Piston .015625 inch before top dead centre.

75—Firing Order 1-3-4-2.

Magnetto Setting—Piston dead centre or slightly after.

SPAULDING.

H—Firing Order 1-3-4-2.
Magnetto Setting—Piston dead centre, lever fully retarded.

SPEEDWELL.

H—Firing Order 1-5-3-6-2-4.
Magnetto Setting—Points break with piston at top dead centre.

Rotary—Firing Order 1-5-3-6-2-4.

Magnetto Setting—One-sixteenth inch after top dead centre, lever fully retarded.

STEARNS-KNIGHT.

Four—Firing Order 1-2-4-3.
Six—Firing Order 1-5-3-6-2-4.
Magnetto Setting—Piston top dead centre, points breaking.

STEVENS-DURYEA.

C 6—Firing Order 1-4-2-6-3-5.
Magnetto Setting—Figure 1 showing in timing window, 25 degrees before top dead centre (flywheel).

STUDEBAKER.

Four—Firing Order 1-3-4-2.
Six—Firing Order 1-5-3-6-2-4.
Remy System—Spark occurs .75 inch after top dead centre.

VELIE.

5 and 9—Firing Order 1-3-4-2.
10—Firing Order 1-5-3-6-2-4.
Magnetto Setting—Piston top dead centre.

VULCAN.

27—Firing Order 1-2-4-3.
Magnetto Setting—Piston dead centre, lever fully retarded.

WAHL.

Firing Order 1-3-4-2.
Magnetto Setting—Piston .125 inch before top dead centre.

WINTON.

Six—Firing Order 1-5-3-6-2-4.
Magnetto Setting—Piston .125 inch after top dead centre, lever fully retarded and points breaking.

ZIMMERMAN.

B6—Firing Order 1-4-2-6-3-5.
Magnetto Setting—Full retard four degrees after dead centre (flywheel). Full advance 20 degrees.

TO HANDLE ADVERTISING.**Bruce Daniels Leaves Pathfinder Concern to Go with Stutz Company.**

Announcement is made by the Stutz Motor Car Company, Indianapolis, Ind., that Bruce Daniels will handle Stutz advertising in the future, as well as act as assistant to Sales Manager W. D. Myers. The latter is planning to spend much of his time on the road during the period preceding the holding of the 500-mile race on the Indianapolis speedway, May 30.

Daniels was for two years advertising manager of the Motor Car Manufacturing Company, maker of the Pathfinder, another Indianapolis concern. According to Myers, the increasing business of the Stutz company and the continued success of Stutz racing cars have made it necessary to establish the department which Daniels now heads, in order to handle more efficiently the advertising and detail work of the sales department.

LEXINGTON-HOWARD COMPANY.**Organized to Take Over Production of Two Well Known Makes of Cars.**

Announcement was made a short time ago of the organization of the Lexington-Howard Company of Connersville, Ind., which has purchased the good will and trade names of the Lexington

Motor Car Company, incorporated in 1908, and the Howard Motor Car Company, which came into existence about the time of the 1913 Chicago show, the direct successor of the Central Car Company. The new concern will continue the production of Lexington and Howard cars, under a combined management, which is expected to result in obvious benefit to purchasers of these machines.

The Lexington is a four-cylinder car and the Howard a six. The statement recently made public by the company sets forth that they are two distinct lines, built in two distinct factories, reaching two distinct fields, but with only one overhead cost. The policy of the company is still further explained in the following signed announcement from E. W. Austel, president:

Why should the automobile business be different from any other business? To my mind it is not, and the sooner it gets down to a horse sense basis the healthier it will be. The day when it was a "game" is gone. The red fire and hurrah period is past. And the companies which stay in are the ones which are going to adopt a hard headed, close margined, businesslike policy.

Correction of Error—In the Jan. 25 issue of The Automobile Journal, the statement that the B. F. Goodrich Company, Akron, O., had reduced the tire mileage guarantee on certain solid tires made by it was in error, insofar as it was made to appear that electric vehicle tires were included in the reduction from 8000 to 7000 miles. The Goodrich company explains that the guarantee for tires on electric vehicles is 8000 miles if run out in 18 months.

ACCO LUBRICANTS.

Composed of Mineral Compounds and Held to Be Free from Acids.

The A. C. C. Oil Company, Boston, is marketing Acco, which is held not to be a grease, but a lubricant composed of mineral compounds scientifically blended, free from mineral or animal acids and corrosive action. It may be termed a universal lubricant, in that it is used for everything requiring lubricating, from the largest to the smallest gear, and all components of the automobile, motor truck or motorcycle, except the motor.

The company calls particular attention to the adhesive-cohesive qualities of Acco, stating that it follows the gears and is not thrown off by centrifugal force. It is also claimed that it does not channel and has a very high fire test, the minimum flash point being about 600 degrees Fahrenheit. It is pointed out that Acco forms a film around the balls and rollers of bearings and positively lubricates them, no matter at what angularity they may be.

Because of its adhesive qualities it is stated that less is needed to lubricate properly, making for economy. Another claim made for Acco is that it quiets metallic sounds and gear noises and is not affected by high temperatures or pressure. The maker states it can be removed easily from any metal or surface by paper or cloth, as no solvent is needed to displace it. Acco is put up in five, 10, 25 and 50-pound packages and comes in glass jars, in tins and in half-barrels and barrels.

CONTEST BOARD MEETING.

Accepts Dirt Track Records and Takes Action on Cyclecar Matters.

At a meeting of the contest board of the American Automobile Association held in New York City, Feb. 11, it was voted to accept the following circular dirt track records, sufficient proof having been submitted to the board: Fifty miles, Disbrow, Simplex, 40:32, Detroit, Sept. 29, 1912; 200 miles, Mulford, Mason special, 3:21:48, Columbus, O., July 4, 1913.

Following a resolution adopted at the annual meeting of the association at Richmond Va., in December, the board went on record as being in favor of embracing, in the 1914 contest rules, classifications and regulations governing cyclecars, and manufacturers of cyclecars were invited to make suggestions along these lines. A

communication was received from Secretary Stout of the Cyclecar Manufacturers' National Association, and the board replied that it was its desire to co-operate to the fullest extent with that body, and invited it to name a representative on the board.

GENEVA'S AUTOMOBILE SHOW.

Twenty-Four Makes of Cars Represented in Third Annual Dealers' Display.

The third annual motor vehicle show of the Geneva Automobile Dealers was held in state armory, Geneva, N. Y., Feb. 11-14, under the management of Louis Blumenstein. Twenty dealers exhibited 24 makes of cars, amid surroundings which served to call special attention to the merits of the vehicles on exhibition. The show was in every way a success, and served as an excellent stimulant to business.

The makes of cars shown were the following: Pierce-Arrow, Chevrolet, Buick, Maxwell, Hudson, Studebaker, Overland, Wahl, Cole, Franklin, Reo, Lyons-Knight, Ford, Mitchell, Lozier, Chandler, Paige, Regal, Cadillac, Saxon, Haynes, Premier, Geneva delivery wagon and Willys Utility wagon.

BLOOMINGTON'S FOURTH DISPLAY.

As a Result Local Dealers Expect to Exceed Business Done Last Year.

During 1913 the 20 dealers in Bloomington, Ill., of which four carry trucks and three electric vehicles, sold 800 cars. There are also 12 garages and three supply houses in the city, all of which are members of the recently organized Bloomington Dealers' & Garage Proprietors' Association. However, the McLean County Automobile Club conducted the fourth annual show Feb. 18-21, as in the past.

The attendance, as well as the business transacted, at the exhibition just ended was such as to place the dealers and others in a very optimistic frame of mind, and it is freely predicted that the number of sales for 1914 will greatly exceed those for 1913. The show was held in the Deere building, under the management of C. C. Wagner. The following made display:

C. C. Davis, Davis; Floyd Iseninger, Ford; J. M. Ijams, Mitchell; F. H. Cole, Hudson; Trott & Stubblefield, Stutz, Marion, Herff-Brooks; D. H. Cornell, Ohio electric; T. K. Hays, Cadillac, Buick; C. U. Williams & Son, Chalmers, Overland, Saxon, Woods electric; J. L. Murray & Co., National, Reo; Ingram Motor Car Co., Jeffery; Gus Shrolle, Allen; Chester Marquis, Marmon, Hupmobile, Detroit

electric; R. E. Herr, Partin-Palmer; T. E. Stewart, Oakland; F. F. Sweeting, American; Patton & Son, Moon; Martin & Clark, Maxwell; Jacob Razor, Lozier, Paige; Laura J. Dooley, Imperial.

MORE ROOM AT KANSAS CITY.

Management Finds It Necessary to Provide for 33 Additional Exhibitors.

Although the annual automobile show in Kansas City is held under the direction of the Kansas City Motor Car Dealers' Association, and no space is sold except to members of that organization, it was found necessary this year to provide additional space by the construction of a temporary balcony, containing 33 spaces. The display was made in Convention hall, and was, in effect, a district show, some 1200 dealers in the Southwest taking advantage of the opportunity afforded for examining the season's offerings. The manager was E. E. Peake, secretary and treasurer of the association, and the list of exhibitors included the following:

Gasoline Pleasure Cars—Auburn Auto Company, Auburn; Bond Motor Company, Maxwell; Bruening Bros. Auto Company, Apperson; Cartercar Company, Cartercar; Chalmers Motor Company, Chalmers; J. I. Case Threshing Machine Company, Case; Cole Motor Company, Cole; Dey-Embry Motor Company, Pierce-Arrow; Franklin Motor Company, Franklin; Ford Motor Company, Ford; Greenlease Motor Company, Cadillac; Hall Bros. & Reeves, Premier; Paige; Holcker-Elberg Manufacturing Company, Peerless; Hupmobile Sales Company, Hupmobile; Hudson-Latham Motor Company, Hudson; Imperial Motor Company, Imperial; Jackson Motor Company, Jackson; Karshner Motor Company, Speedwell, Stutz; KisselKar Branch, KisselKar; Locomobile Company of America, Locomobile; Mitchell Motor Company, Mitchell; Motor Sales & Service Company, Krit; Moriarity Motor Company, Lozier, Abbott-Detroit, Regal; Missouri & Kansas Auto & Supply Company, King; Nordyke & Marmon Company, Marmon; Oakland Motor Company, Oakland; Overland Company, Overland; Oldsmobile Company of Missouri, Oldsmobile; Packard Kansas City Company, Packard; W. A. Paterson Motor Company, Paterson; Rambler Distributing Company, Jeffery; Stafford Motor Company, Stafford; Southwest Motor Company, Reo, Chevrolet; Studebaker Corporation, Studebaker; Velle Motor Company, Velle; Winton Motor Company, Winton; Western Motor Company, Pathfinder, Empire.

Electric Pleasure Cars—Anderson Electric Car Company, Detroit; Baker Electric Company, Baker; Bruening Bros. Auto Company, Waverley; Dodge-Robinson Motor Company, Woods; Ohio Electric Vehicle Company, Ohio; Rauch & Lang Company, Rauch & Lang.

Steam Pleasure Cars—Stanley Steamer Agency, Stanley.

Commercial Cars—Buick Motor Company, Buick; General Motors Truck Company, GMC; Holcker-Elberg Manufacturing Company, Federal; International Motor Company, Saurer; Kelly-Springfield Truck Company, Kelly; KisselKar Branch, KisselKar; Overland Company, Willys Utility; Packard Kansas City Company, Packard; Velle Motor Company, Velle; White Motors Company, White; H. E. Wilcox Motor Car Company, Wilcox.

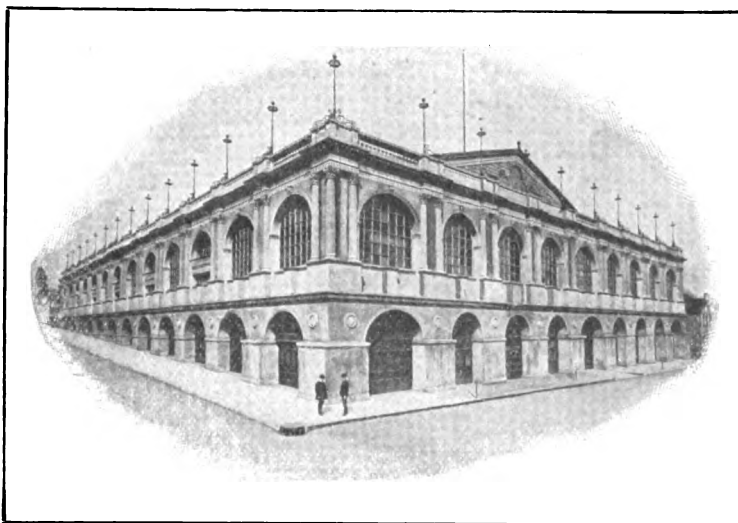
The Stafford is made in Kansas City and the company has planned for an output of at least 125 cars during the coming season.

MOLINE-KNIGHT ORDERS.

President Van Dervoort Says Recent Test Has Increased Demand for Cars.

At no time during its 10 years of existence, according to President W. H. Van Dervoort of the Moline Automobile Company, East Moline, Ill., has that concern received so many orders for cars as during the past few weeks. He believes much of this increase in business to be due to the international records for power, endurance and economy established by the Moline-Knight motor in the recent test in the laboratory of the Automobile Club of America. He says:

The test, however, is not the only reason why extra help has been employed, why new automatic machinery is being installed, and why dealers from the Atlantic to the



Convention Hall, Scene of Successful Kansas City Automobile Show.

Pacific are contracting for Moline-Knights. Other reasons which have caused the Moline-Knight stampede are due to the facts that it is the lowest priced Knight motor car ever offered the public, only Knight with thermo-syphon cooling, only Knight in America with cylinders cast en bloc, and because of its unusual body lines and large dimensions, superior upholstery and finish and the unusually complete equipment.

The Oakland Motor Car Company, Pontiac, Mich., reports that a carload of Oakland cars left the factory this month consigned to Lininger Implement Company, Omaha, Neb., and a second will be shipped in March. An order also has been received from G. W. Hanson of the Oakland Motor Sales Company in Atlanta, Ga., for 10 carloads, and he states that he expects to increase this by the addition of another carload in the near future. These orders, together with those received as the result of recent shows, will tax the shipping department to its fullest capacity.

GENERAL NEWS OF THE INDUSTRY.

Price of Gasoline Is Reduced One Cent a Gallon---Another Model of Thomas Car Is Announced---Knox Plant to Be Sold---New Concerns Organized.

FEBRUARY 24 the price of gasoline was reduced one cent, from 17 to 16 cents a gallon, in 50-gallon lots or more. Probably nothing could cause more interest among motorists generally than this announcement. It means much to the industry as a whole, although several more reductions will be necessary before the price of gasoline reaches a point coincident with that prevailing at the close of 1912.

Soon after Jan. 1, 1913, the price of gasoline was increased from 50 to 80 per cent., depending upon the section of the country. At that time it was explained that several contracts had been in force for some time, and that really the price had been advancing during the life of these contracts, so that the full force of these cumulative advances was felt at one time.

Immediately thereafter, steps were taken, both in this country and abroad, to secure a satisfactory substitute for gasoline, and the resulting experiments and investigations have been continued since that time. It is not expected that announcement of a reduction in price will have any appreciable effect upon this situation, at least at present.

No reason is assigned for the action taken Feb. 24, and those by whom the announcement was made state that they are not in a position to offer any suggestions as to probable future reductions.

ISSUES GOLD BONDS.

Maker of Case Cars Arranges This Plan to Reduce Its Current Loans.

Announcement is made from Racine, Wis., that the J. I. Case Threshing Machine Company of that city, maker of Case cars, has sold to a syndicate, composed of the First Trust & Savings Bank of Chicago and Potter, Choate & Prentice of New York City, an issue of \$12,000,000 first mortgage, six per cent., serial gold bonds, maturing at the rate of \$1,000,000 annually from Dec. 1, 1914, to Dec. 1, 1926. It is understood that this action was taken in order to reduce current loans.

According to a published statement by President F. K. Bull, the profits of the Case company are largely in excess of the amount required to

pay the interest on these bonds and the dividends on the preferred stock. Its quick assets will, according to this same authority, equal the entire amount of obligations, including the bonds now issued, and also the entire par value of the preferred stock outstanding.

The company has an authorized capitalization of \$20,000,000 each of preferred and common, there being at present \$12,150,000 of the former and \$8,300,000 of the latter outstanding.

NEW THOMAS CAR.

E. R. Thomas Motor Car Company of Buffalo Announces Six-Cylinder Model.

Although nothing has been heard from the E. R. Thomas Motor Car Company, Buffalo, N. Y., for some time, a dispatch from that city contains the information that it has brought out a new model Thomas car for the 1914 season. This is to be known as model MCX, and will be built in limited quantities.

It is understood that the motor is a six-cylinder unit, cast in pairs, with bore of 4.25 inches and stroke of 5.5. Ignition is to be by Bosch high-tension magneto and Atwater Kent Unisparker with battery. The chassis is to be the same as the 1912 MC, with wheelbase of 134 inches. Wire wheels and a Gray & Davis lighting and starting system are to be included in the equipment. Five and seven-passenger touring bodies are to be fitted.

TO SELL KNOX PROPERTY.

Court Orders Disposition Either at Private Sale or Auction.

According to an announcement made by Charles G. Gardner, trustee of the Knox Automobile Company of Springfield, Mass., the entire property of the concern will soon be sold either at a private sale or at auction. The company has been operating under bankruptcy for over a year, the receivership dating from Jan. 21, 1913.

The announced sale will include the factory, machinery, fixtures, supplies, parts and cars finished and in the process of construction. Offers

for the whole or any part of the real estate or personal property will be considered and the buyer of the plant acquires the good will of the company and the use of the Knox name.

The trustee states that during the period of bankruptcy the concern has done a gross business of \$1,250,242.21, and, considering the handicap of operating under the direction of the court, this showing would seem to be a most favorable one. It is also stated that during the past few weeks there has been a very gratifying increase in the number of orders received and that the outlook for future business is very encouraging.

The trustee's statement, dated Nov. 30, 1913, shows the following assets:

Real estate	\$298,012.49
Machinery and equipment	224,874.83
Agency equipment	5,000.00
Patterns and drawings	36,936.46
Merchandise inventory	859,337.78
Unexpired insurance	8,000.00
Accounts receivable, net	186,586.65
Cash	15,666.68
Total	\$1,634,414.89

HERRESHOFF LIGHT CAR.

New Product to Be Manufactured in Troy, N. Y.—Will Be Displayed at Boston.

Announcement is made by the Herreshoff Motor Sales Company, Troy, N. Y., of a Herreshoff light car, which will be produced in that city. The product will be displayed for the first time at the forthcoming Boston show. It seats two passengers side by side, and has a wheelbase of 90 inches, tread of 44 inches and weight of 750 pounds.

The motor is a four-cylinder, L head unit, cast en bloc, with bore of 2.375 inches and stroke of 3.75, being rated by the maker at 16 horsepower. Ignition is by the Atwater Kent system. Cooling is by thermo-syphon. Power is transmitted by a cone clutch, three-speed selective gearset and shaft. Quarter-elliptic springs are used.

TO MAKE ALTER CAR.

Detroit Concern Purchases Land for a Factory Site in Plymouth, Mich.

The Alter Motor Car Company has been organized in Detroit for the purpose of producing the Alter car, with 106-inch wheelbase, standard tread and a five-passenger body. The officers are: President, Guy Hamilton; vice president, C. A. Alter; secretary and general manager, R.

A. Skinner, and treasurer, R. S. Todd.

The main offices of the concern are to be located in Detroit, but it is understood that 26 acres have been purchased in Plymouth, Mich., on which to erect a factory.

FORMS NEW COMPANY.

Leslie S. Hackney Organizes Concern to Manufacture Roller Bearing Accelerator.

Leslie S. Hackney of St. Paul, Minn., has perfected a simple, compact roller bearing accelerator, and has formed the Roller Bearing Foot Pedal Company, of which he is president and owner. The concern will have general offices in the Hackney building.

Mr. Hackney has invented a number of mechanical devices and his name is familiar in agricultural circles as the manufacturer of the Hackney auto plow and light farm tractors. He is also the inventor and manufacturer of the Hackney system of ventilation, a cooling



Leslie S. Hackney, Inventor of Roller Bearing Accelerator.

system for internal combustion engines, and numerous other labor saving devices.

BRETZ TAKES CONTROL.

Secures Principal Interest in Massnick-Phipps Manufacturing Company.

The J. S. Bretz Company, New York City, has purchased the controlling interest in the Massnick-Phipps Manufacturing Company, Detroit, according to announcement made in that city. The latter concern does contract machine work, principally the manufacture of motor car parts, and at present is interested in the development of a cyclecar motor. It also makes the La-Vigne steering gear.

LEAVES CATARACT RUBBER.

Richards Interest in That Concern Taken Over by Providence Banking House.

Announcement is made of the resignation of Stephen J. Richards, as director and general manager of the Cataract Rubber Company, Boston, Mass., with factory in Wooster, O. He also was the owner of a large interest in the company, which has been taken over by Newton P. Hutchinson & Co., an investment banking house in Providence, R. I.

During his connection with the company, Mr. Richards worked exceedingly hard to build up the business and place the product on a par with the quality tires of the country, and was decidedly successful in that respect. In accepting his resignation the board of directors was moved to pass the following resolution:

We hereby accept the said resignation of Mr. Stephen J. Richards as a director and the general manager of this company, and in accepting same we wish to recognize his efforts in building up the business of the company and the further fact that it is very largely through the efficient work done by him that the company has reached its present condition in the rubber tire business.

BUYS INTER-STATE PLANT.

New Concern Is Organized in Muncie, Ind., to Continue Production of Cars.

At the auction sale of the Inter-State Automobile Company's plant in Muncie, Ind., early in the month, the entire property was purchased by Frank C. Ball for \$215,000. Immediately thereafter the Inter-State Motor Company was organized with the following directors: George A. Ball, E. B. Ball, Frank C. Ball, J. M. Maring, Theodore F. Rose, F. D. Rose and B. W. Twyman. This concern has taken over the property and will continue the manufacture of Inter-State cars, and it is also understood that plans are under way for the production of a new model to sell at a popular price.

The Ball brothers have long been engaged in the manufacture of Mason fruit jars, and are interested in factories in Muncie, and Wichita Falls, Tex., and in street car lines throughout the country. Mr. Maring is identified with manufacturing interests in Muncie, New Castle and Terre Haute, Ind.; Danville, Ill., and Mansfield, O., and is best known from his connection with the production of the Hoosier kitchen cabinet. Theodore F. Rose is president and F. D. Rose, cashier, of the Union National Bank.

Mr. Twyman, who has assumed the position

of general manager in charge of production and sales, has had long, successful experience with bicycles and automobiles. During the early '90's he was a bicycle racing rider, and was for a long time actively connected with the Black Manufacturing Company, Erie, Penn., until the sale of that concern to the American Bicycle Company. Later, he went with the Waltham Manufacturing Company, Waltham, Mass., maker of Orient wheels, and followed that concern into the manufacture of automobiles. His next experience was with the Logan Construction Company, Chillicothe, O., and then with a number of jobbing concerns in automobiles and accessories in Indianapolis. He next became sales manager of the E-M-F Company, and, subsequently, of the Studebaker Corporation, both of Detroit. More recently he has been engaged as president of the Twyman Motor Car Company, Columbus, Cincinnati and Dayton, O., one of the biggest automobile jobbers in this country.

PURCHASE HAGSTROM FACTORY.

Sales Office Will Be Located at Salina, Kan., and Plant at Linsborg.

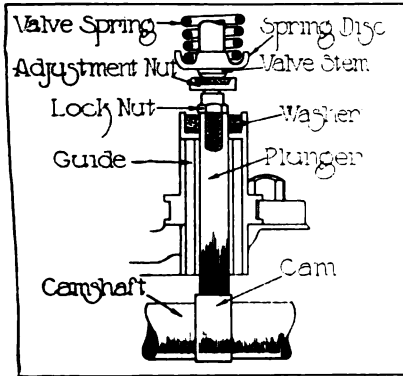
Announcement is made from Salina, Kan., that the plant of the Hagstrom Manufacturing Company, located at Linsborg, Kan., has been purchased by a company composed of the following: President, J. F. Merrill, president of the Farmers National Bank of Salina and of the Falun State Bank; production manager, Charles Lander, a member of the state legislature and the board of regents, and sales manager, R. J. Laubengayer, who has been connected with the sales departments of various eastern manufacturing concerns.

The new company is understood to be well supplied with experience and financial backing, and will continue to produce the well known Hagstrom electrical, rubber and hardware specialties. The line of blow-out patches will be augmented by the addition of a new patch, to be known as the Hagstrom Swede, which will sell at a popular price. The sales office will be retained at Salina.

The Bosch Magneto Company, New York City, reports that the 1914 models of the following makes of motorcycles are equipped with Bosch ignition: Dayton, DeLuxe, Eagle, Excelsior, Flying Merkel, Harley-Davidson, Iver Johnson, Jefferson, Michaelson, Minneapolis, Pope, R-S, Thor and Yale.

SUGGESTIONS FOR THE NEW CAR OWNER.

IF ONE desires to obtain maximum efficiency from motor, care should be taken to occasionally verify the clearance between the valve



Model 79 Overland Valve Tappet Mechanism.

stems and the plungers of the valve mechanism. This may be accomplished by one of two methods, either by inserting an ordinary visiting card between the valve stem and the tappet, or by checking the opening by utilizing the marks

on the flywheel. An accompanying illustration shows the components of the valve mechanism of the model 79 Overland, and it will be noted that means are provided for increasing or decreasing the clearance between the plunger and the valve stem by loosening the locking nut and rotating the adjusting nut. Rotating the nut to the right increases the clearance, to the left decreases the space.

In adjusting for wear, etc., care must be taken to note that the valve is seated, and it is suggested that each valve be adjusted separately.

While the use of a card is suggested by the maker of the car, better results will be obtained if the flywheel markings are utilized. The periphery of the flywheel is marked 1-4 I-C, which indicates the opening point of the intake valves of the first and fourth cylinder. (The No. 1 is the cylinder nearest the radiator.) Rotate the flywheel by hand, opening the compression cocks to lessen the compression, until the marks referred to register with the punched guide mark on the plunger and valve stem is correct, the intake valve of the first cylinder should begin to lift. If early or late, it should be corrected by the adjustment previously referred to. The opening and closing points of the exhaust valves are determined by the flywheel markings, which are indicated by the letters E-O and E-C.

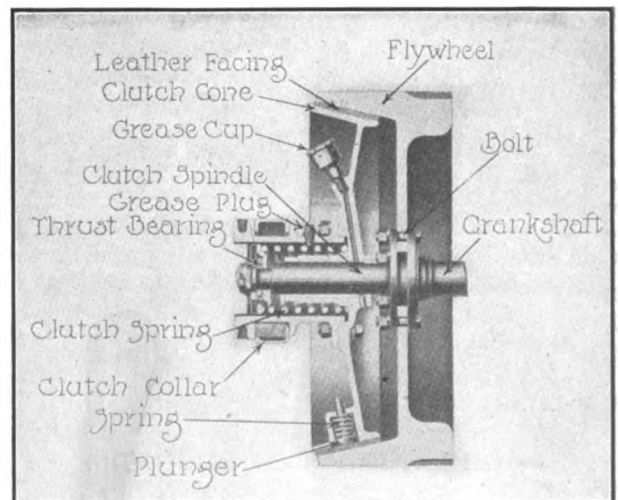
BUICK CLUTCH CONSTRUCTION.

The clutch used with models B 24 and B 25 Buick cars is of the leather faced cone type, hav-

ing three small springs to make for easy engagement. The components are shown in an accompanying sectional view, also the points requiring lubrication. These are the clutch spindle, lubricated by a grease cup, and a pipe plug for lubricating the sleeve and thrust bearing. The only adjustment of the clutch mechanism is the pedal, which releases the clutch cone from the flywheel.

The clutch cone is tapered and a large, heavy coil spring, enclosed in a sleeve, tends to force it into contact or engagement with the flywheel member. At the rear of the sleeve is a coupling which connects the clutch with the clutch shaft of the gearset. The sleeve carries a collar so retained and connected with the clutch pedal that when the last named member is depressed the coil spring is contracted. Or in other words, the cone is disengaged from contact with the flywheel member. When the spring is compressed, the clutch, after overcoming the inertia imparted by the flywheel, remains stationary, riding on the clutch spindle. This permits of interrupting the transmission of the motor's energy to the gearset and road wheels, as when stopping the car or starting the motor for example.

Oil or grease should not be placed in the clutch housing, as the use of a lubricant will cause the clutch to slip. If the leather becomes hard or dry, it may be softened by the appli-



Sectional View of Clutch Used with Models B 24 and B 25 Buick, Showing Method of Assembly.

cation of a few drops of neatsfoot oil. Should the facing become oily, the maker recommends the use of very fine fuller's earth.

WITH THE MOTORING INTERESTS ABROAD.

Public Sentiment on Prince Edward Island Presages Increased Market for Cars in the Near Future--Hornsted Exceeds One American Record--Foreign News.

LAST year the provincial legislature on Prince Edward Island decided that automobiles could be operated with safety on the streets of the two principal cities, Charlottetown and Summerside, three days a week. The new regulations went into effect in July, and since that time 35 cars have been brought into the province. A movement is now on foot to permit operation six days a week and on a number of the principal highways extending through the province.

In the early days of the industry the few cars that made their appearance on Prince Edward Island frightened the horses, and immediately there arose a storm of protests from the rural sections. The regulations of 1913 were so worded as to prohibit the use of motor vehicles on market days, when the rural population was present in the cities in large numbers. It is stated, however, that public sentiment in these outlying districts is somewhat less intense, and that there is every probability that more extensive use of cars will not meet with decided opposition.

The Charlottetown Y. M. C. A. has opened an automobile school for intending chauffeurs and garage men, which now has 45 pupils. There is every indication that at the completion of the present term a sufficient number of new pupils will be secured to warrant a second class. An American instructor has been engaged and the course is to be very thorough. Sessions are held during the day and evening, and at the completion of the regular course, 10 lessons in operation are to be given separately.

Should the proposed legislation be enacted, which seems entirely probable, there will be an immediate demand for 50 or 75 automobiles and light delivery wagons, according to Consul Wesley Frost, located at Charlottetown. A list of possible agents may be procured by addressing the bureau of foreign and domestic commerce, Department of Commerce, Washington, D. C.

MORE HORNSTED RECORDS.

English Driver Succeeds in Lowering American Mark for Flying Half-Mile.

As stated in the Feb. 10 issue of The Automobile Journal, Hornsted of England has been busy with a 200 horsepower Benz on Brooklands

track, Weybridge, England, throughout the past month in an effort to create new world's records, under the plan recently adopted abroad. It would seem from the advices from Great Britain that none but marks established by taking the mean time for a run in both directions were to be accepted as world's records in the future. What becomes of the world's records already adopted by the American Automobile Association does not appear to enter into the consideration.

Hornsted has created new records under the above plan for the standing kilometer, half-mile and mile, and for the flying two, five and 10 miles. In each instance the time has been slower than that accepted by the American Automobile Association, but it must be remembered that there are no such classifications as standing kilometer, half-mile or mile in this country. The Hornsted marks for the above, with the exception of the standing mile and flying 10 miles, were presented in the last issue. His time for the mile was 41.21 (mean time), as against Burman's 25.40, made with the Blitzen Benz at Daytona, Fla., April 23, 1911, although Burman's mark was made from a flying start. Hornsted's time for 10 miles was 5:19.78, as against 5:14.40, made by the late Bruce-Brown in a Benz at Daytona, Fla., March 24, 1909.

However, Hornsted has driven a half-mile, from a flying start, in less time than that represented by the American record, made by Burman in the Blitzen Benz at Indianapolis, Ind., May 29, 1911. His time was 14.53, as against Burman's 16.80, but as it was made in one direction only, it is not credited as a world's record in Great Britain.

ELECTRICS IN TORONTO.

Many Machines of This Type in Constant Service Despite Climatic Conditions.

Because of the heavy snow fall in Canadian cities, those who are not familiar with the facts may be led to believe that it is difficult to operate motor vehicles successfully during the winter months. In Toronto, for instance, where the snow fall for the winter of 1910-11 was 61.3 inches, and for the winter of 1911-12, 76.4 inches, electric passenger and freight cars have been in use for a

number of years. During the past three years these have not been withdrawn from service save for short periods after severe blizzards.

The oldest user of electric vehicles in Toronto is the Verral Company, operating nine sight-seeing machines and a taxicab. Other users include: Robert Simpson Company, department store, five; Heintzman & Co., piano manufacturer, one; M. Langmuir Manufacturing Company, trunk maker, one; Holt-Renfrew Company, furrier, one; T. R. Estabrooks Company, tea importer, one; Bowles Lunch, Ltd., restaurateur, one; McClary Manufacturing Company, stove manufacturer, one; O'Keefe Brewing Company, four; Canadian Express Company, three; Toronto Electric Light Company, two, and Central Press Agency, one.

An accompanying illustration shows the five Detroit electric wagons used by the Robert Simpson Company's department store. Several others

three; Star, two; Vauxhall, three; Martini, one; Adler, three; D. F. F., one.

A. T. Hennessy, vice chairman of the Royal Automobile Club of South Africa, has sent samples of Natal coal to Great Britain for the purpose of determining its value as a producer of benzol, with the object, if found suitable, of establishing a benzol refinery in South Africa.

According to Consul-General Alban G. Snyder of Panama, there are about 120 cars, all gasoline, licensed in the Republic of Panama, of which 50 are for commercial use (hire in garages) and the remainder in private service. With the exception of two French machines, all are of American manufacture.

The newly organized Automobile Club di Sicilia is planning an automobile and motorcycle show to be held in Palermo, Italy, beginning April 21. Its special object is to encourage the use and promote the sale of motor vehicles in Sicily. All types of cars, motorcycles and accessories are to be admitted, and it is expressly desired that American manufacturers make entry. Applications must be addressed to the Automobile Club di Sicilia, Via Catania, No. 2, Palermo.

As a result of a new convention of European countries respecting the use of the international touring pass, a new rule is soon to be in force. Heretofore it has been necessary for the tourist to deposit with the organization of which he was a member sufficient money to cover the duty relating to the car in each country in which he de-



Five Detroit Electric Wagons in Service with the Robert Simpson Company's Department Store in Toronto, Can.

are Detroit machines, while the other makes represented are the G. V., Waverley, Riker, Commercial and the product of the Motor Car Equipment Company. Some of these machines are 10 years old.

NEWS NOTES FROM ABROAD.

At the invitation of the Imperial government of Germany the international road congress in 1916 will be held at Munich.

The value of the motor cars imported into Japan during the first nine months of 1913 was about \$450,000, as compared with \$290,000 for the same period in 1912.

At the recent Scottish automobile show in Edinburgh the following American machines were on display: Cadillac, Ford, Hupmobile, Maxwell, Oakland and Bedford-Buick.

The following cars have made entry for the 1914 Grand Prix of the Automobile Club de France, July 4: Alda, one; Peugeot, three; Sunbeam, three; Nazzaro, one; Opel, three; Mercedes, five; Caesar, one.

The following cars have been entered for the 1914 Tourist Trophy race on the Isle of Man in June: Minerva, three; Humber, three; Straker-Squire, two; Sunbeam,

sired to travel. The new rule will provide that the deposit shall be only that of the highest customs charge made in any of the countries in which he is to tour.

The Society of Manufacturers & Traders, in Great Britain, recently completed a postal ballot of its members on the subject of whether or not to hold a motor show in Manchester, England, next year, with the result that 220 voted in favor of the proposition and 413 against. The vote of the exhibitors was 49 for and 61 against.

Official reports from Nova Scotia state that the people of the province now have invested in automobiles some \$2,000,000. Most of these are of American manufacture, although there is an automobile manufacturing plant located at Amherst, which is reported to have a yearly production of about 60 cars. A recent reliability tour, covering approximately 500 miles, the first to be held in the province, has done much to awaken interest in improved highways, and it is expected that every effort will be made to induce tourists to visit Nova Scotia in 1914.

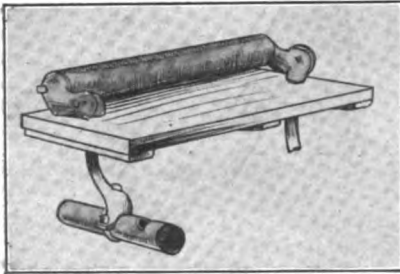
The Imperial Automobile Club of Germany has addressed a circular letter to the affiliated clubs in other countries asking for co-operative consideration of ways and means for securing uniform rules of the road. This circular points out that in England, Luxemburg, Portugal and Sweden, vehicles keep to the left and pass to the right, while in all other countries the opposite rule obtains, although in some European countries there are regions where the vehicles are expected to keep to the right in some instances and to the left in others.

NEW ACCESSORIES FOR THE MOTORIST.

K. P. FOOT REST HEATER.

Utilizes Exhaust to Warm Interior of the Automobile.

The K. P. Foot Rest Heater, manufactured by the K. P. Foot Rest Heater Company, 210 South 17th



street, Philadelphia, differs from the conventional types of heaters utilizing the exhaust, in that it may be used also as a foot rest. One of the qualities of the device is that the control valve is incorporated in it, convenient to the occupant of the tonneau.

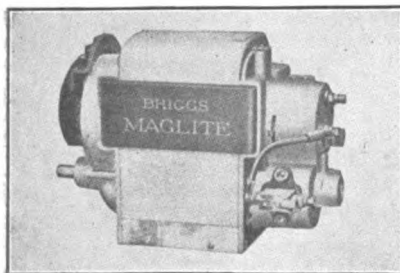
The exhaust is conveyed by a flexible tubing, and after passing through the tube heater, passes to the muffler. It is stated that there is no noise or back pressure, as the gases travel through tubes of constantly increasing diameter. The heater comes in an oxidized, nickel plate or brass finish. When desired the foot rest bar can be covered with carpet to match that of the floor.

BRIGGS MAGLITE GENERATOR.

A Combination Dynamo and Ignition Equipment.

The Briggs Magneto Company, Elkhart, Ind., maker of ignition specialties, is manufacturing the Briggs Maglite, which is a combined lighting generator and ignition unit. It is designed to be mounted on the base provided for the magneto, and is driven through the pump or other convenient shaft, at crankshaft speed when utilized in connection with four-cycle, four-cylinder motors.

The Maglite generates a direct current for charging the storage battery and for lighting the lamps. Its lower half consists of an armature revolving in an electro-magnetic field to generate current, and the field has two windings. One of these is out of



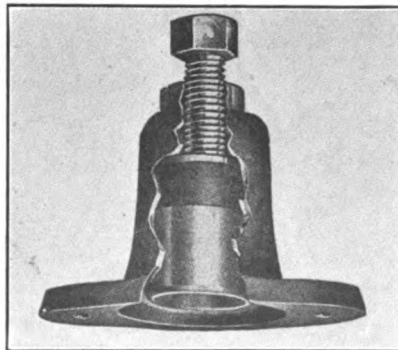
circuit when the unit is operating without the lamps. This is held to avoid overcharging the cells.

The upper half of the instrument is employed for ignition. It consists of a circuit breaker, similar in principle and construction to those employed on conventional magnetos. It mechanically closes and opens the circuit in exact synchronism with the motor, and has a wide range of advance and retard. In addition to this, it has a magneto distributor which automatically distributes the high-tension current to the spark plugs and according to the firing order of the motor.

MOSCO ANTI-RATTLER.

Designed Especially for Ford Steering Gear and Radius Rods.

The Motor Specialties Company, Waltham, Mass., with New York office at 50 Church street, is manufacturing the Mosco anti-rattling ball sockets, which are practical devices for eliminating the rattle of the joints at the ends of the steering gear connecting rods and the ends of the radius rods on Ford cars. They are made in two sizes, the larger be-



ing utilized with the radius rods.

The Mosco automatically takes up play and without restricting the movement of the steering linkage, which invariably results when the two halves of the joint are filed to eliminate lost motion. Adjusting means are provided by a screw member which moves a cup shaped plunger, decreasing the movement of the ball member. The movement of the anti-rattler is obtained by the use of a rubber pad which not only maintains an even pressure on the ball member, but absorbs all road shocks. The Mosco anti-rattler is inexpensive.

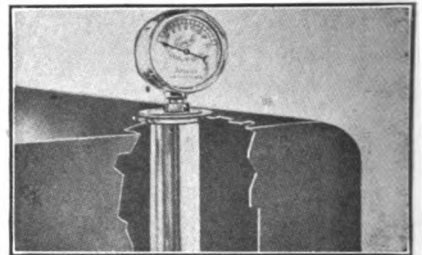
EDITOR'S COMMENT.

The editor desires to call the attention of manufacturers, distributors and agents to the necessity of giving their street address when forwarding data for use in this department. Many complaints have been received from readers who state that their letters were either returned or no answer was obtained. The need of the complete address is obvious.

HANS TANK GAUGE.

Indicates Supply of Fuel by Magnet Principle.

The Hans Motor Equipment Company, La Crosse, Wis., manufactures a large number of designs of fuel



gauges, one of which, a tank design, is shown in an accompanying illustration. It is mounted with its float chamber directly in the tank, the dial case being the only part visible. The type is designed for machines where the fuel container is very accessible.

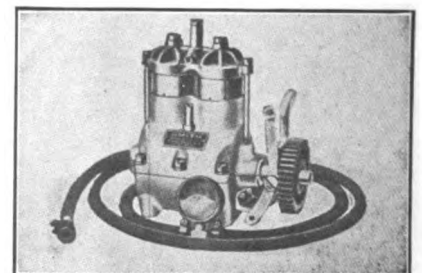
The indicating hand moves over a calibrated dial, and is operated by a magnet mounted behind the dial. The working parts are enclosed in an air tight and dust proof chamber, and the maker states that the construction is leak proof. All of the Hans products are carefully tested before being marketed.

PERFECTION TIRE PUMP.

A Two-Cylinder Design with Complete Equipment.

The Smith Perfection power tire pump, marketed by the Smith Motor Devices Company, Dodgeville, N. Y., is a two-cylinder unit, with the cylinders made of a high grade brass tubing, tested to a capacity of 400 pounds to the square inch. The heads are of special steam bronze to reduce heating to a minimum. The best grade of aluminum is used in the upper and lower crankcases and the main shaft is of chrome nickel steel with non-gran bronze bearings.

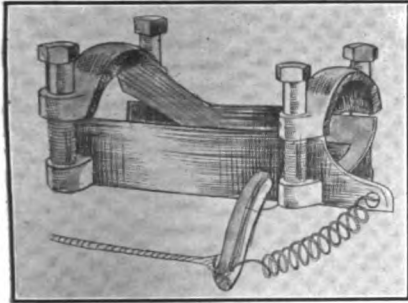
The bronze connecting rods are driven by means of an eccentric, a special drop forging, thus eliminating many parts. The die cast pistons have large wristpins, and compression packings prevent oil from reaching the air chamber. Gears, shifting lever, 15 feet of hose, pressure gauge and copper tubing are included.



X L CUT-OUT.

Cuts Out Exhaust by Means of a Movable Tongue.

The Auto Improvements Company, Bristol, R. I., has brought out a new design of muffler cut-out for model T



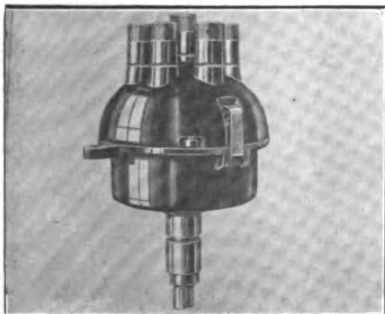
Ford cars, although it is stated that it will be constructed for other makes. The maker claims that it is superior to the conventional types in that it cuts out all of the exhaust by means of a tongue. The last named member, when raised by a pedal, forms a partition in the exhaust line, forcing the gases to pass out through a rectangular opening. The absence of back pressure when not in service is emphasized by the inventor, also ease of attachment. In the illustration the tongue is shown raised.

ATWATER KENT K-2 SYSTEM.

Includes Automatic Advance of the Spark and Reverse Switch.

The Atwater Kent Manufacturing Works, Philadelphia, has brought out a new ignition system termed the K-2 Atwater Kent. It embodies the latest development of each feature of the Unisparker system and includes the Atwater Kent automatic spark advance, which is held to increase the flexibility of the motor, make for economy, and relieve the driver of manual control of the ignition. A quality of the advance device is that the spark is always properly retarded for starting, and advanced for running in proportion to the piston speed.

Another feature of the system is the reversing switch, by means of which the direction of the current through the contact maker is changed each time the motor is operated, an arrangement augmenting the life of the contact points. There is



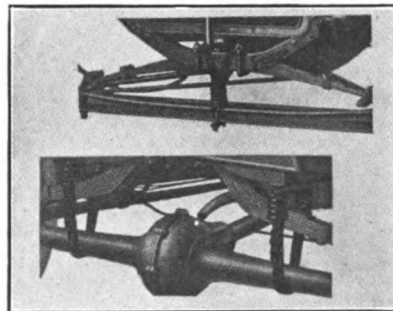
but one contact point to adjust, and it is stated that it will not require attention oftener than every 10,000 miles.

The complete system includes, in addition to the K-2 Unisparker, an "under-hood" coil, reversing switch and suitable length of double primary cable for making connection between the coil and Unisparker. The reversing switch is installed flush with the dash and is provided with a locking key and starting button if desired. The Unisparker must be mounted vertically on a substantial bracket or arbor and is driven at one-half crankshaft speed. Economy of current is one of the features of the Atwater Kent systems.

GEMCO SHOCK ABSORBER.

Ford Design Employing Coil Spring and Straps.

The Garage Equipment Company, Milwaukee, Wis., is marketing a shock absorber for the model T Ford car, which comes three to a set, two being utilized at the rear and one in front. It is claimed by the maker that the Gemco will control excessive spring action when traversing rough roads, impart easy riding qualities



and prevent breaking of the springs.

Both the front and rear members comprise spiral coils, two being used with each rear absorber. The coils are secured to the frame of the car, and from them extend adjustable, heavy straps, which pass under the rear axle. The upward movement, or recoil, which is held to be the most general cause of breakage, is restricted by the coils and strap.

The absorber used in front is fitted to the axle and the cross frame member, but its position is reversed; that is, the strap is placed over the cross frame and the coil clipped to the axle. The Gemco absorbers are moderately priced.

FORD ACCESSORIES.

In keeping with its policy to acquaint its readers with the latest accessories, The Automobile Journal makes in this department the first announcement of four devices for the model T Ford car. These include an anti-rattler for the steering gear connecting rod, fuel tank and radiator caps and number plate holders. Makers of Ford equipment are invited to forward data and illustrations of new devices.

DOVER DUPLEX MEASURE.

Combination Funnel and Measure of Sturdy Design.

The Dover Stamping & Manufacturing Company, Cambridge, Mass., is marketing the Dover Duplex combin-



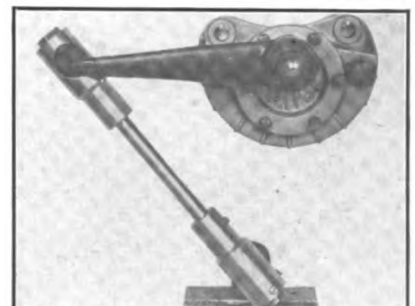
ation measure and funnel, which possesses several practical features, the most noticeable of which is a pouring lip with a centre channel. This permits of fast pouring and in quantities. The opposite side has a funnel, which points slightly upward, so that when the measure is set down all lubricant runs back into it instead of outside.

The design differs from usual Dover practise in that the handle is placed on the side, which makes for convenience when filling oil reservoirs in close quarters or cramped places. As with all Dover measures, it is of correct capacity and conforms with the laws of the various states.

HERZ SHOCK ABSORBER.

Utilizes Swinging Movement of a Steel Lever.

Herz & Co., 245 West 55th street, New York City, has brought out a shock absorber which is held to be a distinct departure from previous designs. In the Herz the resistance necessary for the absorption of the spring vibration is produced by the swinging movement of a steel lever in a specially compounded substance. The maker states that the design is simple and that there is nothing to get out of order. The cast iron box containing the substance also retains the bearings for the inside lever, and is secured to the frame of the car. The outside lever with a ball on its end is attached to a rod having a socket end, and the rod in turn is secured to the spring of the car. It is stated that the Herz absorber has been in service abroad for the past four years. It is guaranteed.



A. A. A. FUEL TANK CAP.

Designed for Ford Cars and Has a Weather Proof Vent.

Among the new Ford accessories marketed by the A. Auto Appliance Company, Providence, R. I., is a neat-



ly designed fuel cap for the roadster type of car having the gasoline tank exposed. One of the qualities of the cap is the use of a small tit in its centre, which the maker states prevents the entrance of water when the car is operated in stormy weather and when it is being washed.

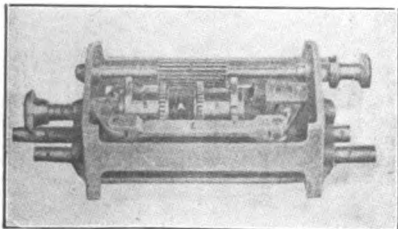
Another feature of the design is the incorporation of a channel around the edge of the cap, it being intended to catch any fuel that may be splashed out through the vent hole, thereby preventing gasoline from running over the container. The caps are constructed of the best grade of bronze and aluminum, and the standard finishes are highly polished nickel and black enamel. The cap not only makes for convenience, but adds to the appearance of the machine.

BUNGAY GEARSHIFT.

Speed Changes Are Secured by Automatic Means.

The Bungay automatic gearshift is marketed by the Bungay Manufacturing Company, Brooklyn, N. Y. Use is made of the energy contained in a compressed helical spring to shift the gears, and through the medium of selector discs and rods. The spring is compressed by the final half movement of the clutch pedal, after which the proper gear may be selected by means of a lever on the steering column. By fully depressing the clutch pedal the energy of the spring is utilized to shift the desired gear through the selector rod and the shifter rod in engagement with it.

The spring employed to shift the gears is shown at A, and is held between two selectors, B, which are controlled through their gears meshing with the gear C on a rod connected to the steering column control. During the final movement of the clutch pedal, the shaft D is moved forward, compressing the spring A in either direction, according to the



speed that is engaged, through the link E, levers F, and cross heads G and H. When in neutral, stops prevent the movement of the selectors and the release of the spring pressure. On the selectors being so turned, however, that one of their slots registers with a stop, the selector is allowed to move past the stop and engage a finger on one of the rods K, shifting the gear selected. The device is stated to weigh but 18 pounds and is adaptable to used machines.

DACO FORD ANTI-RATTIER.

Replaces Ball Socket Steering Gear Cap and Has Grease Cup.

The Danver Accessory Company, 18 Broadway, Pawtucket, R. I., manufacturer of Daco accessories for Ford cars, has brought out a new design of anti-rattler for the steering gear connecting rod. It differs from conventional devices marketed for taking up the lost motion in the ball and socket member, in that a grease cup is provided, making it possible to lubricate the working parts. A quality of the cup is that it locks automatic-



ally, preventing loss of the cup.

Play of the ball and socket is prevented by a coil spring, which carries a hardened steel plunger constructed to conform to the contour of the ball. This spring automatically maintains the proper tension at all times and absorbs shocks that would otherwise be communicated to the driver's hands. The maker states that adjusting means are not necessary as the plunger is hardened, and the parts subject to wear properly lubricated by the grease cup. The Daco combination anti-rattler and grease cup is constructed of high grade material, and all parts are accurately machined, insuring easy attachment to the steering gear connecting rod. It is moderately priced.

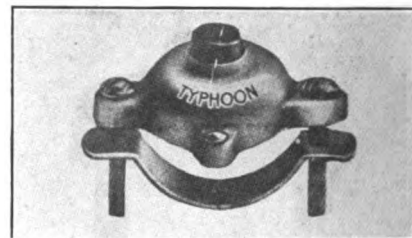
TIRE PUMPS.

That the power tire pump appeals to the motorist is denoted by the large number of letters received asking for specific information as to the practicability of installing it on used machines. Elsewhere in this issue will be found complete data on the subject of power tire pumps, as well as those of the spark plug type.

TYPHOON PUSH BUTTON.

Compact Steering Wheel Fixture for Electric Horns.

A very neat and compact type of push button for operating an electric horn is the Typhoon, manufactured



by the Typhoon Signal Company, Lincoln, Ill. One of the qualities of the design is that it may be attached to the steering wheel or to any flat surface, a clamp being provided for the first named installation. When attached to a flat surface, the clamp is discarded and two wood screws utilized.

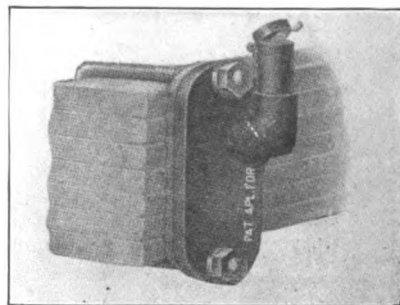
The company is also marketing a steering wheel wiring fixture for electric horns. The leads are concealed, running through a tube alongside the column, with a bend on the upper end, being held by two brackets, and bringing the push button within easy reach of the driver. A flexible tube is employed at the bottom end of the fixture.

GRUS SPRING OILER.

Designed to Provide Constant Lubrication of Leaves.

Several designs have been marketed for forcing apart the leaves of the springs so as to lubricate the bearing surfaces, but a new method of reducing friction is noted in the device being manufactured by Wm. Grus, Jr. & Co., 5213 Wayne avenue, Chicago. The Grus patent leaf spring oiler is attached permanently to the spring, being fitted about one-third the distance from the centre, as shown in an accompanying illustration.

The plate, which is bolted to the side of the springs, is provided with an oil receptacle, which has an opening registering with the springs, and the maker states that the lubricant will automatically find its way to the bearing surfaces. The oiler proper is provided with a cap, which excludes all foreign elements. The device is made in varying sizes for different springs, and is moderately priced.



A. A. A. FORD RADIATOR CAPS.**Sturdy Design Having Scalloped Edges and Letters.**

The A. Auto Appliance Company, 114 West Exchange street, Providence, R. I., manufacturer and de-



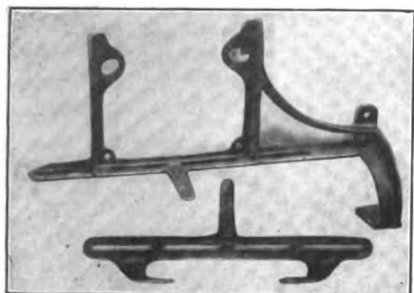
signer of Ford specialties, will market, after March 1, several designs of radiator caps for the model T Ford automobile. One of the qualities of the caps is that they are cast, not stampings. They are constructed of bronze and aluminum, and have scalloped edges, which not only add to the attractiveness of the design, but facilitate removal and replacement. The corrugations are made to fit the fingers, providing an excellent grip.

The threads are accurately cut and the maker guarantees that the caps will fit all model T Ford radiators. They are made in two styles, one a plain cap, and the other with an initial. Two finishes are supplied, a highly polished nickel and black and nickel. The A. Auto Appliance Company is prepared to manufacture radiator caps for all standard makes of cars.

A. A. A. NUMBER HOLDERS.**Constructed for Front and Rear Plates for Ford Cars.**

The securing of the license number plates so that they will conform to the laws, and so that they will not vibrate or rattle, is more or less difficult with some types of machines. The A. Auto Appliance Company, Providence, R. I., is manufacturing two types of number plate holders for the model T Ford car, and the maker states that either can be fitted in a few minutes, and that the location of the holders is such as to comply with the automobile laws of all states.

The design for the front number plate is the smaller in the illustration, and it will be seen that it is provided with two arms or projec-

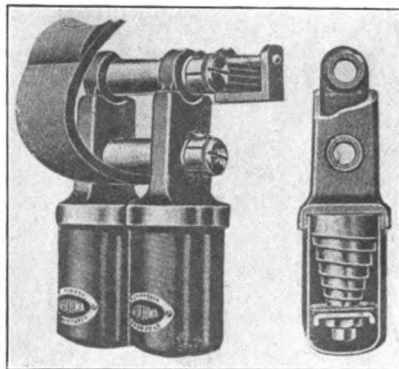


tions. These have holes, which are so spaced that the holder may be slipped over the threaded ends of the spring clips, and locked securely by the usual nuts. This makes for a rigid suspension. The number plate is bolted or secured by machine screws and nuts to the holder proper.

The larger design is for attachment to the rear spring, and it is secured in a similar manner to the front holder. Provision is also made for carrying the tail light, and a quality of the design is that the arm is sturdily constructed to withstand road shocks. The holders are made of malleable iron, and are finished in nickel or black enamel.

G-S SHOCK ABSORBERS.**Combine Spring and Compressed Air Principles.**

The G-S "Geschwa" shock absorbers are marketed by the Geschwa Importation Company, Hartford, Conn., and road shocks, vibration, etc., are compensated for by the combination of a spring and novel use of the compression of air. The spring employed is not an ordinary coiled member. It is a flat, highly tempered spring, coiled in a spiral conical form, as shown in the smaller illustration, and it is stated that when it is compressed it forms a pneumatic air



cushion, eliminating shocks, also controlling the rebound of the car springs.

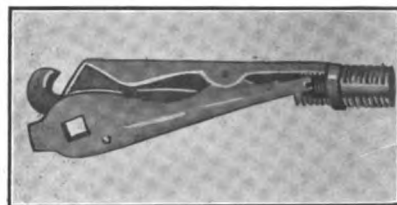
An air chamber is provided at the bottom, this governing the spring suspension of the machine, and the compartment has a relief to equalize upward and downward movement. The arm attached to the shock absorber spring moves in a housing, and is secured to the lower spring when three-quarter ellipses are used, for example, while the top car spring is secured to a bolt extending through the housing of the absorber.

It is claimed by the maker that the G-S can be completely telescoped without affecting flexibility or efficiency, and that the design is unbreakable. It is also stated that it can be attached or removed with slight expense, and that it may be adjusted to varying loads. The G-S absorbers are sold with a guarantee for one year, and are made for varying spring suspensions and different makes of machines.

In writing for prices, etc., always mention The Automobile Journal.

WONDER TIRE DEFLATOR.**A Five-in-One Practical Combination Pocket Tool.**

The usual method of deflating an inner tube when in the casing and on the car, is to depress the valve



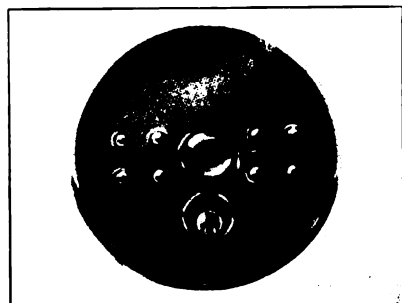
plunger, a process that takes time. The Sprick Bros. Investment Company, Stickney, S. D., is manufacturing what is termed the Wonder tire deflator, which is a combination tool, in that it may be utilized for five different purposes.

As will be noted by the accompanying illustration, one end of the tool can be clamped or snapped on the valve stem and by moving the lever toward the main body of the device the valve plunger is fully depressed, permitting the air within the inner tube to escape freely. The Wonder can be carried in the pocket and also serves as a Prest-O-Lite key, screw driver, valve plunger remover and bottle opener.

THE LOCK-ALL.**Electric Switch Locking Lights and Ignition.**

During the past six months a large number of locking devices, designed to prevent operation of the car by others than those intended, have made their appearance. Among the latest is the Lock-All, an electrical device, manufactured by the H. P. B. Electric Company, 500 Fifth avenue, New York City. It is an electrical switch and lock combined, very compact and neat in appearance.

The Lock-All controls the operation of the lights, ignition and electric horn, and the lock utilized is a Yale. The switch is also fitted with a central knob, which, when kicked by the driver, serves to direct the current from the head to the side lights, or vice versa, without removing the hands from the steering wheel. It is stated that the lights may be locked in any combination, and that the ignition circuit can be broken or magneto grounded and locked to prevent use of the car.



CORRESPONDENCE WITH THE READER.

Lubricating Systems.

Kindly explain, for the benefit of a non-technical automobilist, a reader of your book, the meaning of the terms used by manufacturers in cataloguing their lubricating

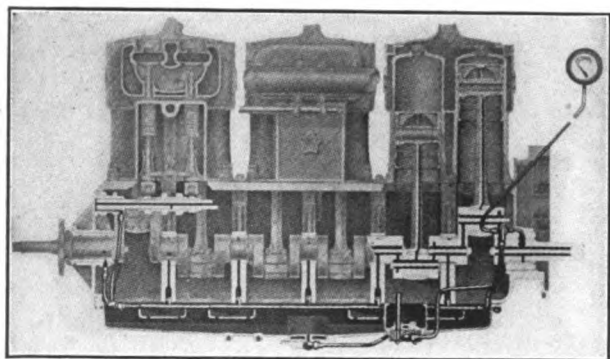


Fig. 1—Showing Leads Utilized in Pressure or Constant Circulating Type of Lubricating System.

systems. It appears to me a jumbled up mess of words. The catalogues speak of constant levels, automatic splash, circulating, pressure, etc. Which is which?

PERPLEXED.

Sioux Falls, South Dakota, Feb. 8.

Lubricating systems may be divided into two general classes, splash and pressure, and these combined. The principle of the splash system is one in which the ends of the connecting rods dip into an oil reservoir in the lower half of the crankcase, splashing the lubricant to the working parts of the motor. The system may include means for feeding the lubricant to the crankcase, such as a pump, or by utilizing the pressure of the exhaust to force the oil to the reservoir, etc. Provision may also be made to maintain a certain level of lubricant in the crankcase, and when such is the case the system is termed the constant level splash.

The pressure or constant circulating principle involves the delivery of the lubricant from the reservoir through piping to the main bearings, wristpins, etc., from which the excess oil gravitates back to the reservoir, whence it is again taken up by the pump and again circulated. The splash-pressure system is a combination of the two above described. There also is the non-circulating system in which the oil is used but once.

An example of the pressure or constant type is shown at Fig. 1, the illustration depicting the system employed on the Marmon car. It will be noted that the crankshaft and camshaft are drilled from end to end, and that there is an independent feed of oil direct from the pump to the seven main bearings of the crankshaft and to the ends of the camshaft. There are outlets for each

of the five bearings of each camshaft, similar to those through which the oil reaches the crankpins from the hollow camshaft. From the chief distributing points at the main bearings, the lubricant is conducted through the hollow crankshaft to the crankpins and from them to the wristpins, so that the oil is delivered under direct pressure to the parts. A gauge on the dash indicates the pressure under which the system is operating. The path of the lubricant is easily followed in the illustration by the black lines.

A combined system, which is catalogued by the maker of the car as automatic, is shown at Fig. 2. It is used with the Lozier motor. It provides the splash feature, as the lubricant is delivered to a trough under each connecting rod, the oil being forced to the vessel by a pump. These troughs tilt, being connected to the throttle linkage in such manner that at high motor speeds the ends of the connecting rods dip deeper. The oil levels at varying speed are indicated in the illustration by dotted lines. The linkage and oil reservoir are also shown.

Drive of Motor Starters.

Which is the better method of imparting the energy of the electric motor starter, by chain or by gear to the crankshaft or flywheel of the engine? PURCHASER.

New Haven, Conn., Feb. 15.

It is a matter of opinion. Both have their advantages and are used by representative car manufacturers.

Grinding Compound.

Can you give me a recipe for making a good valve grinding compound, one that will cut fast?

AMATEUR REPAIRMAN.

Denver, Col., Feb. 8.

An excellent and rapid cutting abrasive may

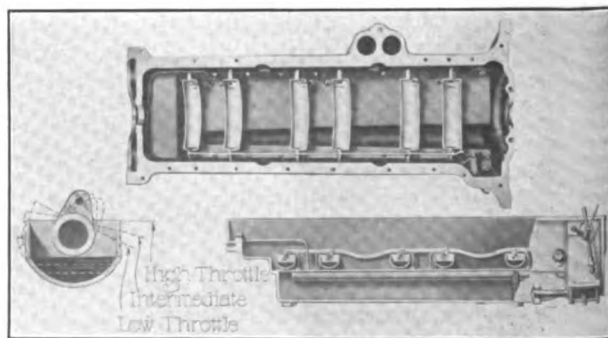


Fig. 2—Combined Splash and Pressure Feed Lubricating System—It Is Also Termed Automatic Because of the Use of Tilting Troughs.

be made by mixing oil with the finest of carborundum. If not familiar with its use it is best to use plenty of oil in grinding.

IN THE COMMERCIAL VEHICLE FIELD.

Result of Six Months' Service with Foden Steam Trucks in Contract Haulage in New York City---Details of Commerce Chassis---America's Longest Daily Haul.

AFTER operating two Foden steam trucks, made by Fodens, Ltd., Sandbach, England, for some six months, the Terminal Transport Company, Kingsbridge avenue and 236th street, finds that with a trailer it is possible to work these machines at an expense of 15 cents a ton-mile. Since these vehicles are the only ones of this make being operated in America, it will prove of interest to consider some of the factors which have been determined by this concern.

The Foden wagon has an engine of the compound type, the steam jacketed cylinders of which have bore of four inches, high pressure, and 6.75 inches, low pressure, and stroke of seven inches. The boiler is built along the lines of the horizontal locomotive boiler and is hydraulically tested to 350 pounds, for a safe, working pressure of 200 pounds. The firebox is made large to take either coke or coal, and the total heating surface of the firebox and tubes is 70 square feet.

Underneath the chassis is a 160-gallon water tank, permitting a supply sufficient for a run of from 15 to 20 miles. The pump discharges through a feed water heater at the left of the engine, into which exhaust steam is led. An injector also is fitted. A steam syphon at the right of the coal bunker, just back of the driver's seat, and 11 feet of hose, permit water to be taken from a brook or other source of supply en route.

A two-speed gear is provided, giving speeds of two and six miles an hour. Drive is by sliding gears on the crankshaft, and thence by roller chain of 2.5-inch pitch to a live rear axle. The radius rods are threaded right and left to permit adjustment of this chain. Two sets of brakes are fitted, in addition to the use of the lever in re-

verse position. The service brake acts upon the flywheel and is actuated by the foot, while the emergency band brake operates on a drum on the rear axle. Steering is accomplished in the same manner as with the ordinary road roller, the front axle being pivoted at the centre.

As will be noted by an accompanying illustration, the bodies are arranged so as to be dumped, and this may be accomplished either by hand or by steam. The body is hinged at the rear and the load may be deposited in one place or spread as desired. The trailers utilized by this concern were supplied by Scannell & Nephew of London,



Dumping a Load of Material from Foden Steam Truck by Utilizing Power of the Engine.

a firm of motor engineers with which Fodens, Ltd., has a contract for this class of work. They are connected to the truck by a long drawbar with a spring at the forward end, designed to take up all shocks. There is no provision for dumping the trailers, although the rear ends and sides are hinged at the bottom and open outwardly.

It may be stated that Foden wagons have been sold for so-called Colonial service in many parts of the world, and statements concerning these vehicles which have been received in this country have indicated that they were particularly well adapted for service where there were

Average Monthly Cost of Operating Two Foden Steam Trucks and Three Trailers.

	Cost	Per Cent.
Depreciation at 10 per cent. a year....	\$84	8.3
Insurance, etc.....	25	2.4
Repairs, 10 per cent. a year.....	84	8.3
Garage rental.....	25	2.4
Coal, six tons at \$8.....	48	4.7
Coke, 150 bushels at 11c.....	16	1.5
Oil, 25 gallons at 40c.....	10	1.0
Waste, gloves, polish, etc.....	4	.5
Permits, licenses, etc.....	4	.5
Engineers, two, 26 days at \$5.50.....	286	28.0
Helpers, two, 26 days at \$3.....	156	15.2
Manager's salary.....	200	19.6
Watchman, at \$3 a day.....	78	7.6
Totals.....	\$1020	100.0
Average cost a machine a day.....		\$19.60
Average cost a machine a ton-mile.....		0.15

no roads, in the generally accepted use of that term. The experience of the Terminal Transport Company, according to its manager, Robert L. Niles, Jr., has been that they are not adapted for use on poor roads.

He says it is necessary to have roads with good foundation, and he explains this statement by calling attention to the weight of the vehicle and the distribution of the load. The truck is rated at six to seven tons. Ready for the load the vehicle weighs approximately 7.5 tons. Study of the illustration will indicate that a large proportion of the load is carried by the rear axle. Mr. Niles says that the weight to which the rear axle is subjected is about 12 tons. He adds that this concentration of weight might be avoided when the use of narrow cleats and wide spacing on the steel tires is permissible to give traction, but the marking which results on asphalt and bituminous pavements precludes this type of driving wheel in the vicinity of New York. Fodens, Ltd., has produced vehicles of this capacity fitted with rubber tires for use in Great Britain, but Mr. Niles is of the opinion that the cost of such tires would be prohibitive when trailers were used. The foreign

trailers used by this concern also are steel shod.

The company has experimented with various kinds of fuel. Soft coal has been found best for making steam, but introduces smoke and cinders. Coke is clean, but has insufficient lasting qualities and is rather bulky. The cheaper grades of coal and briquettes are held to be absolutely worthless. The machines are using a mixture of Plymouth red ash stove coal and coke, about half and half by volume. The bunker holds about 300 pounds of this mixture, and for long runs extra fuel is carried in bags with the load. Mr. Niles says the average consumption is eight to 16 gallons of water and from 10 to 20 pounds of fuel to the mile, depending upon the condition of the road surface and the grades.

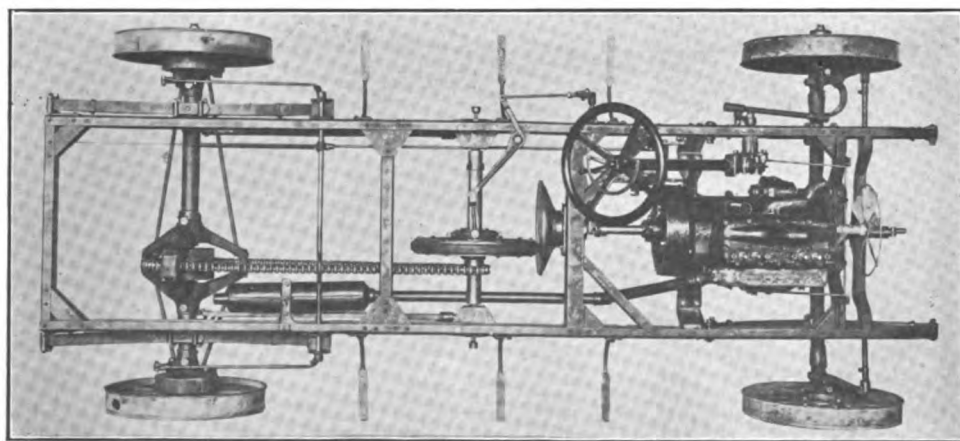
The ton-mile cost stated above is based on a daily mileage of 30. The cost figures presented herewith are taken from the report supplied by Mr. Niles to the treasurer of the company at the close of 1913. They represent a monthly average based upon the actual cost of the several items, although it is probable that there may be some variation in the matter of mileage from month to month. The report covers the cost of each item and its percentage of the total for the two Foden steam trucks and the three trailers owned by the company.

COMMERCE DELIVERY WAGONS.

Constructional Details of a Chassis Designed to Meet a Specific Demand.

Specializing on a single chassis, rated at 1000 pounds, the Commerce Motor Car Company, Detroit, maintains that its product has qualities that adapt it for a wide variety of service, while its design and construction are such that it can be

operated with a very large measure of economy. The concern was established three years ago for the purpose of producing a vehicle that should satisfy a general demand for those who used a single-horse wagon, but who sought to serve longer routes and a greater number of customers, minimizing time and extending the area in which



Plan View of the Commerce Delivery Wagon Chassis, Showing Friction Transmission, Etc.

business of this kind might be transacted.

The motor employed in the Commerce delivery wagon is a Northway, four-cylinder, water-cooled, L head type, cast en bloc, with bore of three inches and stroke of 4.5. This gives a rating under the S. A. E. formula of 14.2 horsepower, but the maker claims it will develop 20. Lubrication is by a combination of force feed and splash. Ignition is by Bosch magneto with fixed spark. The carburetor is an automatic float feed type.

Power is transmitted by friction discs to the jackshaft, and thence by chain to the live rear axle, in which is incorporated the usual differential. The service brakes are of the expanding type on the rear wheels, while the reverse of the friction transmission is employed for emergency purposes. The frame is of four-inch pressed steel channel section with five cross members.

ton, Mass. The round trip is 130 miles, and this is covered five days in the week, in direct competition with the railroad as represented by the Adams Express Company.

The Warren river oysters are highly esteemed and the Boston customers are anxious that they shall be shipped under such conditions as will preserve their delicacy of flavor. Under the plan, by which it was necessary to rely upon the Adams Express Company, seven separate handlings were required, and to insure forwarding by this method the tubs had to be in readiness by 4 in the afternoon. The consignees demanded that the deliveries be made at 7 in the morning, but in point of fact deliveries were made anywhere between 7 and 12.

Last September Mr. Cotrone visited the Warren growers and interviewed the Boston consignees, with the result that he decided to under-



Two Peerless Trucks Utilized by Frank Cotrone & Co., Providence, R. I., in Making America's Longest Daily Haul.

The springs are semi-elliptic, those at the rear being outside the frame and shackled at either end. The driver is placed at the left.

This chassis is fitted with four body types, these being an open express with flare boards, express with standing top enclosed by curtains, a full panel with rear doors or end gate, and a stake platform.

COMPETING WITH RAILROAD.

Interesting Service Involving What Is Held to Be America's Record Daily Haul.

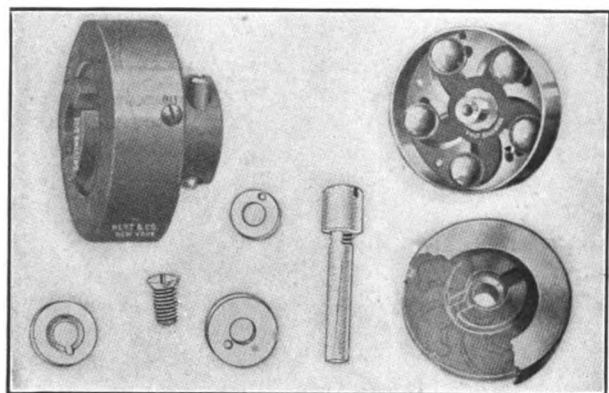
What is believed to be the longest daily haul by motor truck in America is that made by the two Peerless trucks owned by Frank Cotrone & Co., Providence, R. I., engaged in the transportation of oysters between Warren, R. I., and Bos-

take the delivery of oysters by motor truck over the road. Under the present plan the tubs are in readiness at any time between 4:30 and 6:30 in the afternoon. One of the trucks is of five-ton capacity and the other of four. One hundred tubs can be packed into the former and 80 into the latter.

After loading the trucks are taken to the garage in Providence, where they remain until midnight. Five hours are allowed for the running time between Providence and Boston. Deliveries are made before 7, and all empties are picked up. The trucks usually are back in Providence by 1 in the afternoon, and sometimes at 12, noon. Since no deliveries are made on Saturday, the trucks are not in service between Saturday noon and Monday noon, so that any necessary work may be done on them at that time. In addition, the drivers go over the machines each night.

MACHINERY, TOOLS, EQUIPMENT AND SUPPLIES.

HERZ & Co., electrical engineer, is marketing the Herz patented automatic time adjustment for ignition apparatus. It is designed not



Herz Automatic Time Adjustment for Ignition Apparatus Up to 40 Degrees.

only to prevent accident through back firing, caused by improper advance of the spark, but it is held to make for economy in the operation of pleasure and commercial vehicles. The time of ignition is adjusted automatically in accordance with the number of revolutions, and the range is up to 40 degrees.

The components of the device are shown in an accompanying illustration and it will be noted that it comprises a coupling consisting of two juxtaposed discs, the construction being interposed between the magneto and driving shaft. Each disc is provided with five grooved curves running in an opposite direction to those in the other disc. Five steel balls are held in these grooves and function in a similar manner to the weights of a governor, being forced outward by centrifugal force in direct proportion to the speed of the motor. The maker states that this construction imparts a twist to the armature of the magneto in relation to the driving shaft.

It is held that any desired degree of adjustment may be obtained by altering the curves in a suitable manner, and that the absence of springs, journals, joints, etc., and the certainty with which the balls are guided, make for reliability of operation.

The device is supplied either as an integral part of the ignition apparatus or in the form of a coupling. Owing to the small space it occupies it is stated that in many instances it can be used in place of the ordinary coupling and without alteration. All parts are made to gauge, are interchangeable, and constructed of the best of ma-

terial. Special literature is issued by the company and will be sent free on request.

O. K. TOOL POST.

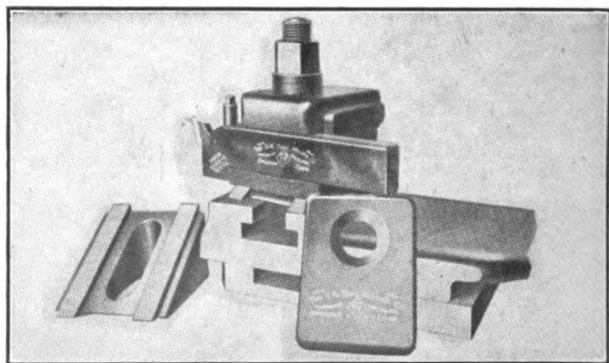
The O. K. Toolholder Company, Shelton, Conn., of which C. Hilterbrant, 99 Nassau street, New York City, is direct representative, is manufacturing the O. K. tool post holder, shown in an accompanying illustration. It holds the tool on the side, thus enabling one to get up near the chuck or face plate. With this tool post the tool is adjusted vertically, thus maintaining the clearance on the cutting tool. The tool post swings around at any angle.

It is stated by the company that after placing it in the desired position, the process of tightening has no tendency to twist the tool post, and that the bolt is made to fit the T slot so that there is no danger of injuring the same. The nut is made to fit the tail stock wrench.

When it is necessary to grind the tool and it is desired to remove the tool or holder, the vertical adjustment is not affected. By swinging the tool post around at right angles and using a small V block, it is held that the design makes the strongest kind of a boring tool holder. All parts are steel drop forgings, carefully machined, case hardened and interchangeable.

The O. K. is made in three sizes, the No. 1 post being suitable for 14 to 18-inch lathes, the No. 2 for 20 to 28, and the No. 3 for 30 to 40. The tool post No. 1 is adapted for holders from one inch to 1.5 high and any width, the No. 2 from 1.25 to 1.75 high, and the No. 3 from two to 2.5 inches high and any width.

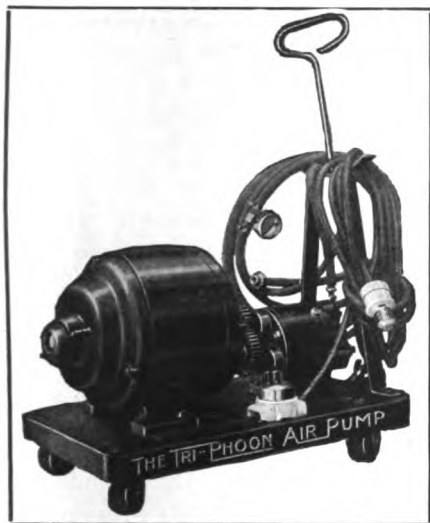
The O. K. Tool Holder Company also manufactures the O. K. system of tool holders, and tools for lathes, planers, shapers, boring mills, etc.



O. K. Tool Post for Holding Tool on the Side and for Adjusting It Vertically.

TRI-PHOON GARAGE PUMPS.

The Green & Swett Company, 737 Boylston street, Boston, is manufacturing the Tri-Phoon



Triphoon Electrically Driven Garage Pump.

garage pump, which is not only moderately priced, but is very small and compact, occupying but little room in the garage. One of the qualities of the pump is that it does not require the use of a pressure tank, as tires can be inflated directly and

very quickly. The cost of operating is slight.

The pump is made in three and six-cylinder forms and the motor employed for the smaller size is constructed for either a direct or alternating current. The six-cylinder unit is also marketed for either direct or alternating current.

One of the features of the Tri-Phoon is that it may be driven at a high rate of speed without injury to the working parts. As shown by the accompanying illustration, it includes a .25 horsepower electric motor, suitable length of flexible cord with plug, hose, pressure gauge and switch. The equipment is mounted on a substantial platform truck, which has a convenient handle for moving it about the garage.

The Tri-Phoon garage pumps are adapted for both private and public garages, and the guarantee is very liberal, the maker offering to replace free of charge any pump found to be defective or faulty in construction within a year. Descriptive matter will be supplied upon request.

PAINTING THE CAR.

Outfit for Ford and Small Car Owners Is Marketed by Northwestern Chemical Co.

Owners of small cars, especially those who care for their own machine, will be interested to learn that the Northwestern Chemical Company, Marietta, O., has brought out a complete equipment for painting Ford and small machines. Not

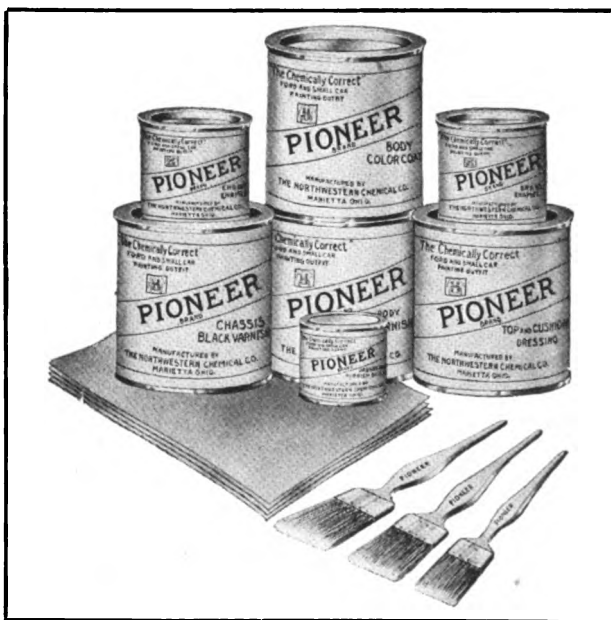
only does the outfit include all material, such as paints, brushes, sandpaper, etc., but complete directions are given, which if followed, will enable one to turn out a job to compare favorably with that of an expert.

The color card gives option of six colors, these being red, blue, orange, tan, gray and green. An outfit for painting both the chassis and body black is marketed, retailing at 75 cents less than the other colors.

The sample colors are rich and the finish is high grade in every particular. The outfit includes one can each of the following materials: Body color varnish, body color paint, black pigment varnish, top and upholstery dressing, gloss black brass enamel, gloss black engine enamel and mahogany varnish stain. The brush equipment is sufficient for using all of the above and without employing one brush for two materials.

The directions accompanying each outfit, which is moderately priced, are so given that it is a simple matter for anyone not familiar with painting to obtain excellent results. The different steps of the work are outlined and explained: in fact, instruction is given for preparing the room in which the painting, etc., is to be done.

The following concerns have been elected to membership in the Motor & Accessory Manufacturers: Michigan Steel Casting Company, 248 Guoin street, Detroit; New Haven Clock Company, New Haven, Conn., and Standard Tool Company, 6918 Central avenue, Cleveland, O.



Pioneer Outfit, a Complete Equipment for Painting Ford and Small Cars.



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THE BOSTON SHOW.

Interest in the forthcoming Boston automobile show, especial reference at this moment being made to the pleasure car section, in every branch of the motor vehicle industry has been greatly increased by the fact that all automobile shows held thus far this year have created new records in the matter of attendance and business transacted. The annual Boston show has for many years been regarded as the best possible barometer by which to judge of the possibilities for business during the ensuing season. The fact that other shows have indicated splendid possibilities for the 1914 season only tends to enhance the importance of the Boston display.

At this writing, the applications for space are such as to indicate beyond doubt that the 1914

Boston show will retain its position of leader in number of makes and models of cars on exhibition. Since 1910, this New England display, although designated as a local dealer's exhibition, has not only been the largest in this country, but the largest in the world. In the matters of attendance and volume of sales, it has established a record which no other has been able to reach.

New England has long been conceded to be the world's best market for motor vehicles and their accessories, supplies and fittings. This is still true, despite the wonderful progress that has been made in other sections of the country during the past few years. The people are regarded as conservative, particularly in making investment, and it is for this reason that the sales consummated during the annual Boston show have been adopted as the criterion.

Insofar as the commercial vehicle display is concerned: This will be the only exhibition of power wagons of national importance this year. The term national importance is used advisedly, for, although the Boston show always has been a local display, its size, in every respect, has been such as not only to make it a national, but an international, event. Manufacturers have long been aware of this fact and have aided the local dealers in bringing about the splendid results obtained. It is expected that they will take every advantage of the opportunities afforded by this exclusive commercial vehicle display to present the merits of their product in a field where the possibilities are virtually unlimited.

Boston is so easy of access from every portion of New England and the Maritime Provinces of Canada that there is certain to be a larger attendance than ever before, particularly because of the increased interest in motor vehicles in the latter district. That none will be disappointed in the exhibition itself, is evidenced by the list of exhibitors and the products they will display, appearing elsewhere in this issue. Several new makes of cars and dozens of new accessory lines will be presented. Manager Chester I. Campbell and the members of the Boston Automobile Dealers' Association and the Boston Commercial Motor Vehicle Association are to be congratulated upon the success which has attended their efforts in connection with the 1914 Boston show—which promises, in every respect, to be bigger and better than ever.

GASOLINE PLEASURE CARS FOR 1914.

A Buyer's Guide to Makes and Models Produced by the American Industry for the Coming Season---Detailed Mechanical Specifications, Body Types and Prices.

PROSPECTIVE purchasers of gasoline pleasure cars will find the tabulations on the succeeding pages the most complete compilation of specifications concerning the various makes and models in the market for the 1914 season that it is possible to present. The information from which these tables were prepared has been supplied by the manufacturers and represents the very latest available.

There has been radical departure from the practise, which applied generally at one time, of announcing new models at the national automobile shows in New York and Chicago. Very few concerns now present yearly models as such. This situation may be held to be due in no small measure to the rivalry among manufacturers, which ultimately found expression in making such announcements for the succeeding year soon after the annual show season was closed. Under the new arrangement, changes in designs and construction are made public whenever manufacturing conditions seem to warrant.

During the past few years it has been decidedly noticeable that many of these changes have appeared in connection with the Boston show, which is held at the very beginning of the active driving season, and at a time when the public is prepared to make up its mind with reference to any possible purchases. It follows, therefore, that specifications presented in conjunction with the annual Boston show represent the latest developments of the industry—a dependable buyer's guide for the coming year.

Explanation of Tables.

Some little thought has been given to the presentation of these specifications, with a view to assisting the prospective purchaser in making comparison of the various models. In the tabulations devoted to the mechanical details of the several chassis, care has been taken to separate the four-cylinder and six-cylinder cars. Incorporated with these details are the prices and maximum seating capacity of the runabouts, roadsters, etc., on the one hand, and the touring cars on the other. This arrangement is expected to facilitate comparison of various cars at or about the same price.

Following the detailed specifications are presented a number of tables giving the price, seating capacity, wheelbase and tire sizes for en-

closed cars and other special body types, again sub-divided as to the fours and sizes, so that immediate comparison may be made on this score. It will be understood, of course, that the name of make and model will serve as sufficient key to determine the chassis details for these machines, as presented in the larger tabulation. Taken together, these tables present a complete index to the American gasoline automobile industry for the 1914 season.

The addresses of the various manufacturers will be found on the next page. This list includes practically every maker at all prominent in the industry. This statement must be qualified to some extent, because of fact that new concerns are being announced frequently. Some have entered the field since the work of compiling these statistics was begun. Others have been reorganized and information concerning their new product is not available at this time.

Analysis of Specifications.

Analysis of the tables shows another important trend in the industry. Of the 104 makers of four-cylinder chassis, producing a total of 139 models, 58 are manufacturing fours exclusively, and of these 34 make but one chassis model. Included in this classification is the Willys-Overland Company, which is listed as producing both the Overland and the Willys-Knight.

The list of six-cylinder chassis shows a total of 76 makers and 110 models. Of these, 33 makers are producing six-cylinder chassis exclusively, and 18 of these make but one model.

Added to those already mentioned, are the 16 makers of fours and sixes, which produce one chassis model of each type. Included in this classification are the American Voiturette Company, making the Car-Nation and Keeton, and the Lexington-Howard Company, producing the Lexington and Howard.

In many instances, where the same concern is producing a four and a six, the bore and stroke of the two motors are identical. This classification might be extended still further, if those makers who produce chassis, differing only in the wheel-base, were added.

Other features indicated by the tabulations include the general adoption of electric lighting and some form of starter, usually electric, as well as the preponderance of the left hand drive.

ADDRESSES OF GASOLINE CAR MAKERS.

- Abbott-Detroit**—Abbott Motor Co., Detroit, Mich.
Allen—Allen Motor Car Co., Fostoria, O.
American—American Motors Co., Indianapolis, Ind.
Ames—Ames Motor Car Co., Owensburg, Ky.
Apperson—Apperson Bros. Automobile Co., Kokomo, Ind.
Arbenz—Arbenz Car Co., Chillicothe, O.
Auburn—Auburn Automobile Co., Auburn, Ind.
Austin—Austin Automobile Co., Grand Rapids, Mich.
Benham—Benham Mfg. Co., Detroit, Mich.
Briscoe—Briscoe Motor Co., New York City.
Bulck—Bulck Motor Co., Flint, Mich.
Cadillac—Cadillac Motor Car Co., Detroit, Mich.
Cameron—Cameron Mfg. Co., New Haven, Conn.
Car-Nation—American Voiturette Co., Detroit, Mich.
Cartercar—Cartercar Co., Pontiac, Mich.
Case—J. I. Case Threshing Machine Co., Racine, Wis.
Chadwick—Chadwick Eng. Works, Pottstown, Penn.
Chalmers—Chalmers Motor Co., Detroit, Mich.
Chandler—Chandler Motor Car Co., Cleveland, O.
Chevrolet—Chevrolet Motor Co., Flint, Mich.
Coey—Coey-Mitchell Automobile Co., Chicago, Ill.
Colby—Standard Motor Co., Mason City, Ia.
Cole—Cole Motor Car Co., Indianapolis, Ind.
Continental—Martindale & Millikan, Franklin, Ind.
Corbitt—Corbitt Automobile Co., Henderson, N. C.
Correja—Vandewater & Co., Elizabeth, N. J.
Crane—Crane Motor Car Co., Bayonne, N. J.
Crescent—Crescent Motor Co., Carthage, O.
Croxton—Croxton Motor Car Co., Washington, Penn.
Crow Elk-Hart—Crow Motor Car Co., Elkhart, Ind.
Cunningham—J. Cunningham, Son & Co., Rochester, N. Y.
Davis—G. W. Davis Motor Car Co., Richmond, Ind.
Detroit—Briggs-Detroit Co., Detroit, Mich.
DeSoto—DeSoto Motor Car Co., Auburn, Ind.
Dispatch—Dispatch Motor Car Co., Minneapolis, Minn.
Dorris—Dorris Motor Car Co., St. Louis, Mo.
Empire—Empire Automobile Co., Indianapolis, Ind.
Enger—Enger Motor Car Co., Cincinnati, O.
Fal—F. A. L. Motor Car Co., Chicago, Ill.
Fiat—Fiat Automobile Co., Poughkeepsie, N. Y.
Flyer—Flyer Motor Car Co., Detroit, Mich.
Ford—Ford Motor Co., Detroit, Mich.
Franklin—H. H. Franklin Mfg. Co., Syracuse, N. Y.
Gleason—Bower Machine Works Co., Kansas City, Mo.
Glide—Bartholomew Co., Peoria, Ill.
Grant—Grant Motor Car Co., Findlay, O.
Great Eagle—U. S. Carriage Co., Columbus, O.
Great Southern—Great Southern Automobile Co., Birmingham, Ala.
Great Western—Great Western Automobile Co., Peru, Ind.
Havers—Havers Motor Car Co., Port Huron, Mich.
Haynes—Haynes Automobile Co., Kokomo, Ind.
Henderson—Henderson Motor Car Co., Indianapolis, Ind.
Herreshoff—Herreshoff Motor Co., Detroit, Mich.
Holly—Holly Motor Co., Mt. Holly, N. J.
Howard—Lexington-Howard Co., Connersville, Ind.
Hudson—Hudson Motor Car Co., Detroit, Mich.
Hupmobile—Hupp Motor Car Co., Detroit, Mich.
Illinois—Overholt Co., Galesburg, Ill.
Imperial—Imperial Automobile Co., Jackson, Mich.
Jackson—Jackson Automobile Co., Jackson, Mich.
Jeffery—Thomas B. Jeffery Co., Kenosha, Wis.
Keeton—American Voiturette Co., Detroit, Mich.
King—King Motor Car Co., Detroit, Mich.
Kissel-Kar—Kissel Motor Car Co., Hartford, Wis.
Kline-Kar—Kline Motor Car Corp., Richmond, Va.
Knox—Knox Automobile Co., Springfield, Mass.
Krit—Krit Motor Car Co., Detroit, Mich.
Lambert—Buckeye Mfg. Co., Anderson, Ind.
Lenox—Lenox Motor Car Co., Boston, Mass.
Lewis—L. P. C. Motor Co., Racine, Wis.
Lexington—Lexington-Howard Co., Connersville, Ind.
Locomobile—Locomobile Co. of America, Bridgeport, Conn.
Lozier—Lozier Motor Co., Detroit, Mich.
Luverne—Luverne Automobile Co., Luverne, Minn.
Lyons-Knight—Lyons-Atlas Co., Indianapolis, Ind.
Marathon—Marathon Motor Works, Nashville, Tenn.
Marion—Marion Motor Car Co., Indianapolis, Ind.
Marmon—Nordyke & Marmon Co., Indianapolis, Ind.
Maxwell—Maxwell Motor Co., Detroit, Mich.
McFarlan—McFarlan Motor Co., Connersville, Ind.
McIntyre—W. H. McIntyre Co., Auburn, Ind.
Mercer—Mercer Automobile Co., Trenton, N. J.
Meteor—Meteor Motor Car Co., Shelbyville, Ind.
Metropol—Metropol Motors Co., Port Jefferson, N. Y.
Metz—Metz Co., Waltham, Mass.
Mitchell—Mitchell-Lewis Motor Co., Racine, Wis.
Moline-Knight—Moline Automobile Co., East Moline, Ill.
Monarch—Monarch Motor Car Co., Detroit, Mich.
Moon—Moon Motor Car Co., St. Louis, Mo.
Morse—Easton Machine Co., South Easton, Mass.
Moyer—H. A. Moyer, Syracuse, N. Y.
National—National Motor Vehicle Co., Indianapolis, Ind.
Norwalk—Norwalk Motor Car Co., Martinsburg, W. Va.
Oakland—Oakland Motor Car Co., Pontiac, Mich.
Oldsmobile—Olds Motor Works, Lansing, Mich.
Overland—Willys-Overland Co., Toledo, O.
Packard—Packard Motor Car Co., Detroit, Mich.
Paige—Paige-Detroit Motor Car Co., Detroit, Mich.
Palmer-Singer—Palmer & Singer Mfg. Co., Long Island City, N. Y.
Partin-Palmer—American Mfg. Co., Ecorse, Mich.
Paterson—W. A. Paterson Co., Flint, Mich.
Pathfinder—Motor Car Mfg. Co., Indianapolis, Ind.
Peerless—Peerless Motor Car Co., Cleveland, O.
Petrol—Petrol Motor Car Co., Milwaukee, Wis.
Pierce-Arrow—Pierce-Arrow Motor Car Co., Buffalo, N. Y.
Pilot—Pilot Motor Car Co., Richmond, Ind.
Pope-Hartford—Pope Mfg. Co., Hartford, Conn.
Pratt—Elkhart Car Mfg. Co., Elkhart, Ind.
Premier—Premier Motor Mfg. Co., Indianapolis, Ind.
Pullman—Pullman Motor Car Co., York, Penn.
Rayfield—Rayfield Motor Car Co., Springfield, Ill.
Read—Read Motor Car Co., Detroit, Mich.
Regal—Regal Motor Car Co., Detroit, Mich.
Reo—Reo Motor Car Co., Lansing, Mich.
Republic—Republic Motor Car Co., Hamilton, O.
Richmond—Wayne Works, Richmond, Ind.
Saxon—Saxon Motor Co., Detroit, Mich.
Selden—Selden Motor Vehicle Co., Rochester, N. Y.
S. G. V.—S. G. V. Co., Reading, Penn.
Simplex—Simplex Automobile Co., New York City.
Spaulding—Spaulding Mfg. Co., Grinnell, Ia.
Speedwell—Speedwell Motor Car Co., Dayton, O.
Spoerer—Carl Spoerer's Sons Co., Baltimore, Md.
Staver—Staver Carriage Co., Chicago, Ill.
Stearns-Knight—F. B. Stearns Co., Cleveland, O.
Stevens-Duryea—Stevens-Duryea Co., Chicopee Falls, Mass.
Studebaker—Studebaker Corp., Detroit, Mich.
Stutz—Stutz Motor Car Co., Indianapolis, Ind.
Touraine—Touraine Co., Philadelphia, Penn.
Tribune—Tribune Motor Co., Detroit, Mich.
Vaughan—Vaughan Car Co., Kingston, N. Y.
Velle—Velle Motor Vehicle Co., Moline, Ill.
Vulcan—Vulcan Mfg. Co., Painesville, O.
Westcott—Westcott Motor Car Co., Richmond, Ind.
White—White Co., Cleveland, O.
Willys-Knight—Willys-Overland Co., Toledo, O.
Winton—Winton Motor Car Co., Cleveland, O.
Zimmerman—Zimmerman Mfg. Co., Auburn, Ind.

SPECIFICATIONS OF 1914 FOUR-CYLINDER CARS.

Key to Abbreviations: Cylinder type—L, valves in the head; L, L head; T, T head. How cast—B, en bloc; P, in pairs; S, separately; T, in triplets. Lubrication—C, combination; P, pressure; S, splash; SP, splash with pump circulation. Cooling—A, air; P, pump; T, thermo-syphon. Fuel feed—G, gravity; P, pressure. Carburetor—Car, Carter; Flet, Fletcher; Hol, Holley; King, Kingston; Mar, Marvel; May, Mayer; New, Newcomb; PL, Planhard; Ray, Rayfield; Sch, Schieber; St, Stromberg; Zen, Zenith; Zep, Zephyr. Ignition—A. K., Atwater Kent; Bos, Bosch; Br, Briggs; Conn, Connecticut; Del, Delco; Elsa, Elsmann; King, Kingston; Mich, Michigan; Nat, National; Sim, Simms; Spl, Splitdorf; West, Westinghouse. Clutch—C, cone; CB, contracting band; D, disc; EB, expanding band. Transmission—F, friction; PL, planetary; Pr, progressive; S, selective. Rear axle—D, dead; F, full floating; ½, semi-floating; ¾, three-quarter floating. Starting and lighting—G. & D., Gray & Davis; Leece-N., Leece-Neville; N. East, Northeast; Rush., Rushmore; Ward-L., Ward Leonard; West, Westinghouse. Driver—L, left; R, right; O, optional.

Make and Model	Roadster		Touring		Cyl. Type	How cast	Bore and Stroke	S. A. E. H. P.	Piston Displacement	Lubrication	Cooling	Fuel Feed	Carburetor	Ignition	Clutch	Transmission	Speeds	Rear Axle	Wheelbase	Tires	Lighting and Starting	Driver
	Seats	Price	Seats	Price																		
Abbott-Detroit 34-40.....	3	\$1685	5	\$1685	L	B	4½x5½	27.25	280.6	SP	P	G	Zen.	Sp.	D	S	3	F	116	34x4	Autolite	R
Abbott-Detroit 44-50.....	3	1985	5	1985*	L	B	4½x5½	32.40	349.9	SP	P	T	Zen.	Sp.	D	S	3	F	121	36x4½	Autolite	R
Allen 40.....	2	1395	5	1395	L	B	4½x5	27.25	267.3	SP	P	T	Sch.	—	D	S	3	F	118	34x4	Autolite	R
American 422.....	2	1550	5	1785	L	B	4 x 5	25.60	251.3	SP	P	T	—	Eise.	D	S	3	F	105	36x3½	—	L
Ames 45.....	2	1745	5	1785	L	B	4½x5½	27.25	280.6	C	P	P	Sch.	Remy	D	S	3	F	118	36x4	G. & D.	L
Apperson 4-45.....	2	1600	5	1600	T	S	4½x5	32.40	318.1	P	P	G	Ray.	Nat.	CB	S	3	F	116	34x4	electric	L
Apperson 4-45.....	2	1825	5	1785	T	S	4½x5	32.40	318.1	P	P	G	Ray.	Mea	CB	S	3	F	120	36x4	electric	L
Arbenz.....	2	1490	6	1590	T	B	4½x5½	32.40	318.1	C	P	P	Sch.	Sch.	C	S	3	F	120	36x4	electric	L
Auburn 4-40.....	2	900*	5	900*	L	B	3.2 x 5½	16.62	166.7	—	—	—	—	Remy	C	S	3	F	106	—	Remy	L
Briscoe.....	2	950	5	1050	I	P	3¼x3¾	22.50	165.6	SP	P	P	Mar.	Del.	C	S	3	½	105	32x3½	Delco	L
Buick B 24-25.....	2	1235	5	1335	I	P	3¼x5	22.50	220.9	SP	P	P	Mar.	Del.	C	S	3	½	112	34x4	Delco	L
Buick B 36-37-38.....	2	1975	5	1975	L	S	4½x5½	32.40	365.8	SP	P	P	Own	Del.	C	S	3	F	120	36x4½	Delco	L
Cadillac.....	2	1200	5	1200	I	B	3¼x5	20.25	206.4	SP	T	G	King	—	D	S	3	½	115	32x3½	Deihl	L
Cameron.....	2	1200	5	1200	I	B	3¼x5	20.25	206.4	SP	T	G	King	—	D	S	3	½	115	32x3½	Deihl	L
Car-Nation.....	2	1250	5	1250	L	B	3¼x3¾	19.60	192.4	SP	P	P	Sch.	Del.	F	S	3	½	106	32x3½	Delco	R
Cartercar 7.....	2	1600	5	1700	L	P	4½x4¾	22.25	253.9	SP	P	G	Sch.	Br.	D	S	3	½	116	36x4	Jesco	R
Cartercar 5.....	2	1600	5	1700	L	P	4½x4¾	22.25	253.9	SP	P	G	Sch.	Br.	D	S	3	½	116	36x4	Jesco	R
Case 25.....	2	1850	5	1850	T	P	4½x5½	28.90	312.0	SP	P	P	Ray.	Bos.	D	S	3	F	120	35x4½	West.	L
Case 35.....	2	2300	5	2300	T	P	4½x5½	32.40	334.0	SP	P	P	Ray.	Bos.	D	S	3	F	124	37x4½	West.	L
Case 40.....	2	750	5	750	I	B	3.6 x 4	21.38	170.9	S	T	G	Zen.	Sim.	C	S	3	½	104	32x3½	Autolite	L
Chevrolet Royal Mail.....	2	875	5	875	I	B	3.6 x 4	21.38	170.9	S	T	P	Zen.	Sim.	C	S	3	½	104	32x3½	Autolite	L
Chevrolet Baby Grand.....	2	995	5	995	T	P	5½x5½	48.40	498.9	S	T	P	Sch.	Bos.	D	S	3	F	128	34x4	Autolite	L
Coe.....	2	1925	5	1925	L	P	4½x5½	28.90	297.8	S	P	P	St.	Del.	C	S	3	F	120	34x4½	Delco	L
Cole Four.....	2	1000	5	1000	L	B	3¼x5	19.60	192.4	S	T	G	—	—	C	S	3	F	110	37x3¾	optional	L
Continental 30.....	2	1800	5	1800	L	B	4½x4¾	32.40	286.3	S	P	G	Sch.	Remy	D	S	3	F	118	34x4	Jesco	R
Continental 27.....	2	1450	5	1600	L	P	4 x 4½	25.60	226.2	C	P	G	St.	A. K.	D	S	3	F	120	34x4	N. East	R
Corbett D. E. F.....	2	1275	5	1275	T	B	4½x4¾	28.90	269.4	SP	P	T	Opt.	—	D	S	3	F	116	34x4	Jesco	R
Crescent Ohio.....	2	2500	5	2500	L	B	4½x5½	27.25	294.0	S	P	T	PL	Mea	D	S	3	F	121	36x4½	N. East	L
Croxton A. B. X.....	2	1150	5	1185	L	P	4 x 5	25.60	251.3	SP	T	G	Sch.	Br.	D	S	3	½	114	33x4	electric	R
Crow Elk-Hart D 42-45.....	2	1575	5	1600*	L	B	4½x5½	28.90	312.0	SP	T	G	Sch.	—	D	S	3	½	120	34x4	electric	R
Crow Elk-Hart D 52-54-55-56.....	2	3500	5	3750*	I	P	4½x5½	36.10	407.6	C	P	P	Ray.	Bos.	D	S	3	F	124	36x4½	N. East	L
Cunningham M.....	2	1335	5	1335	L	B	3¼x5	19.60	192.4	SP	T	G	St.	West.	D	S	3	½	112	33x4	West.	L
Davis 35 J-K.....	2	1025*	5	1025*	L	B	3¼x5	19.60	192.4	SP	T	G	St.	Bos.	D	S	3	F	118	37x4½	G. & D.	R
Davis 50A.....	2	850	5	900	L	B	3¼x5	22.50	220.9	SP	T	G	Zen.	Spl.	D	S	3	F	104	33x3½	Remy	L
Detroit A.....	2	2500	5	2500	I	P	4½x5	30.63	300.7	SP	P	P	Flet.	Bos.	D	S	3	F	121	36x4½	U. S. L.	R
Dispatch.....	2	908	2	900	L	P	3¼x4½	22.50	198.8	SP	T	G	Hol.	Eise.	D	S	3	½	110	32x3½	West.	L
Dorris I.....	2	1285	5	1285	L	P	4½x5½	32.40	334.0	S	P	G	Sch.	Remy	D	S	3	F	120	34x4	N. East	R
Empire 31.....	2	2500	5	2500	L	B	4½x5½	28.90	312.0	S	P	G	Sch.	West.	D	S	3	½	114	34x4	West.	R
Eager.....	2	1600	5	1600	L	B	4½x5½	28.90	312.0	C	P	P	Sch.	West.	D	S	3	F	116	34x4	West.	R
Fal.....	2	4000	5	4000	L	B	4½x6	30.63	360.8	P	P	P	Own	Bos.	D	S	4	½	123	36x4½	West.	R
Fal Grayhound.....	2	4500	5	4500	L	B	5½x6½	42.00	567.3	P	P	P	Own	Bos.	D	S	4	½	128	36x4½*	West.	R
Fiat 54.....	2	495	5	550	L	B	2½x4½	12.10	107.0	S	T	G	Opt.	—	D	S	2	F	100	28x3	Ward-L.	L
Fiat 55.....	2	500	5	550	L	B	3¼x4	22.50	176.7	S	T	G	Opt.	Own	PI	2	½	100	30x3½	—	L	
Flyer A.....	2	1840	5	1840	L	B	4½x5½	27.25	280.6	S	P	G	Sch.	West.	D	S	3	F	118	34x4	West.	L
Ford T.....	2	495	5	550	L	B	3¼x4	22.50	176.7	S	T	G	Sch.	West.	D	S	3	F	118	34x4	West.	L
Glide 36-42.....	2	1840	5	1840	L	B	4½x5½	27.25	280.6	S	P	G	Sch.	West.	D	S	3	F	118	34x4	West.	L
Grant 21.....	2	495	5	550	L	B	3¼x4	22.50	176.7	S	T	G	Sch.	West.	D	S	3	F	118	34x4	West.	L
Great Eagle B.....	2	3500	7	3500	T	P	4½x5½	36.10	389.9	P	P	G	Ray.	Eise.	C	S	3	F	135	37x5	Autolite	L
Great Southern 50.....	2	1750	5	1750	L	P	5.19x6	43.05	507.2	C	P	G	St.	Bos.	C	S	3	½	128	36x4*	—	L
Great Western.....	2	1710	5	1710	L	S	4½x5½	28.90	312.0	SP	P	G	Opt.	King	C	S	3	F	118	36x4	G. & D.	R
Great Western-Carter.....	2	1985	5	1985	L	P	4½x5½	22.50	254.0	SP	P	G	Opt.	King	C	S	3	F	118	36x4	G. & D.	R
Haynes 28.....	2	1785	5	1785	L	B	4½x5½	27.25	294.0	S	T	G	Opt.	Eise.	CB	S	3	F	118	34x4	Leece-N.	L
Henderson De Luxe.....	3	1350	5	1350	L	B	3¼x4¾	18.25	161.0	SP	T	G	St.	West.	D	S	3	F	110	32x3½	Ward-L.	L
Herrshoff 4-30.....	2	1200*	5	1200*	L	B	3¼x5½	16.90	182.5	P	T	G	Zen.	Bos.	D	S	3	F	106	32x3½	West.	R
Hupmobile 32.....	2	1300*	6	1300*	L	B	3¼x5½	16.90	182.5	P	T	G	Zen.	Bos.	D	S	3	F	126	33x4	West.	L
Hupmobile 32.....	2	1400	5	1400	L	P	4½x4¾	28.90	269.4	S	P	P	Sch.	Remy	D	S	3	F	120	37x4	—	L
Illinois K-14.....	2	1500	5	1500	L	B	4½x5½	28.90	297.8	SP	P	G	St.	Remy	D	S	3	½	114	34x4	N. East	R
Imperial 32-33.....	2	1650	5	1650	L	P	4½x5	32.40	318.1	C	P	P	St.	Remy	D	S	3	F	118	36x4	N. East	L
Imperial 34.....	2	1525	5	1385	L	P	4½x4¾	27.25	253.9	C	P	P	Sch.	Remy	C	S	3	F	115	34x4	Autolite	R
Jackson Olympic.....	2	1885	5	1885	L	P	4½x5½	32.40	334.0	P	P	P	Sch.	Remy	C	S	3	F	124	36x4	Autolite	R
Jackson Majestic.....	2	1550	5	1550	L	B	3¼x5½	22.50	231.9	C	P	P	—	Bos.	C	S	4	F	116	34x4	U. S. L.	L
Jeffery Four.....	2	1195*	5	1195*	L	B	3¼x5	24.00	235.8	SP	T	G	St.	Br.	D	S	3	F	112	33x4	Ward-L.	L
King B.....	2	1850	5	1850	L	P	4½x5½	32.40	334.0	SP	P	P	St.	Bos.	C	S	4	F	121	36x4	electric	R
Kissel-Kar 40.....	2	1685	5	1685	L	S	4 x 4½	25.60	232.5	C	P	G	St.	Bos.	C	S	4	F	115	34x4	Rush	L
Kline-Kar 4-30.....	2	1985	5	1985	T	P	4.32x5¾	29.71	335.9	C	P	G	St.	Bos.	D	S	3	F	120	36x4	Rush	L
Kline-Kar 4-40.....	2	3550	5	3500	I	S	5 x 5½	40.00	430.9	C	P	G	St.	Bos.	D	S	3	F	Opt.	36x4½	Esterline	R
Knox 44.....	2	3800	7	3800	I	S	5 x 5½	40.00	430.9	C	P	G	St.	Bos.	D	S	3	F	126	37x5	Esterline	O
Knox 45.....	2	1050*	5	1050*	L	B	3¼x4	22.50	176.7	S	T	G	St.	Bos.	D	S	3	F	108	32x3½	Disco	L

*Abbott-Detroit 44-50—Starting and lighting system \$100 extra. American 422—Electric lights, air starter. Biacoe—\$750 without starter. Cadillac—Two-speed rear axle. Cameron—Special transmission. Detroit—\$850 without starter. Fiat 55—Rear tires, 37x5. Hupmobile—\$1050 and \$1200 without starter. King—\$1095 without starter. K-R-I-T—\$950 without

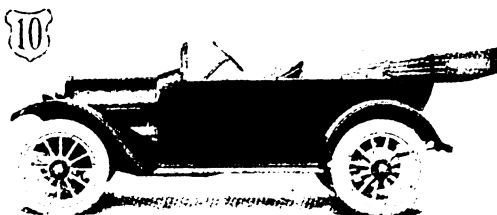
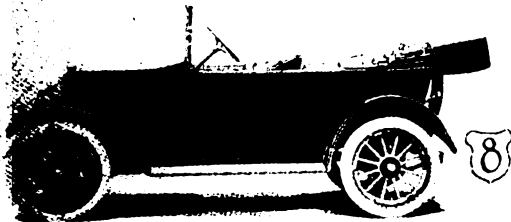
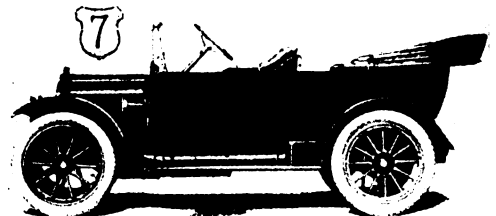
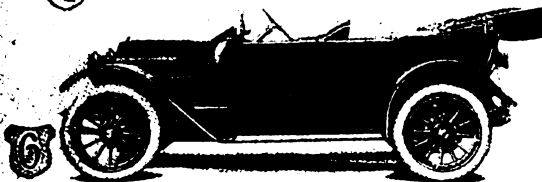
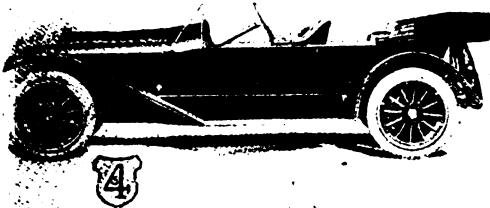
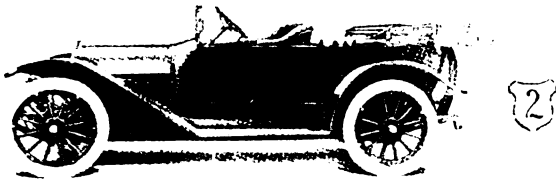
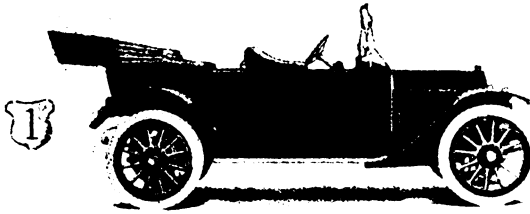
SPECIFICATIONS OF 1914 FOUR-CYLINDER CARS.

Key to Abbreviations: Cylinder type—L, valves in the head; L, L head; T, T head. How cast—B, on bloc; P, in pairs; S, separately; T, in triplets. Lubrication—C, combination; P, pressure; S, splash; SP, splash with pump circulation. Cooling—A, air; P, pump; T, thermo-siphon. Fuel feed—G, gravity; P, pressure. Carburetor—Car, Carter; Flet, Fletcher; Hol, Holley; King, Kingston; Mar, Marvel; May, Mayer; New, Newcomb; PL, Pineshard; Ray, Rayfield; Sch, Schaefer; St, Stromberg; Zen, Zenith; Zep, Zephyr. Ignition—A, K. Atwater Kent; Bos, Bosch; Br, Briggs; Conn, Connecticut; Del, Delco; Elia, Elsmann; King, Kingston; Mich, Michigan; Nat, National; Sim, Simms; Spl, Splittdorf; West, Westinghouse. Clutch—C, cone; CB, contracting band; D, disc; EB, expanding band. Transmission—F, friction; PL, planetary; Pr, progressive; S, selective. Rear axle—D, dead; F, full floating; 1/2, semi-floating; 3/4, three-quarter floating. Starting and lighting—G & D, Gray & Davis; Leeco-N, Leeco-Neville; N, East, Northeast; Rush, Rushmore; Ward-L, Ward Leonard; West, Westinghouse. Driver—L, left; R, right; O, optional.

Make and Model	Roadster		Touring		Cyl. Type	How cast	Bore and Stroke	S.A.E.H.P.	Piston Displacement	Lubrication	Cooling	Fuel Feed	Carburetor	Ignition	Clutch	Transmission	Speeds	Rear Axle	Wheelbase	Tires	Lighting and Starting	Driver
	Seats	Price	Seats	Price																		
Lambert 46	—	—	5	\$1200	L	B	3 3/4 x 5 1/4	22.50	231.9	C	P	G	Sch.	Br.	—	F	—	1/4	112	32x3 1/2	Briggs	L
Lambert 60	—	—	5	1395	B	B	4 1/4 x 5 1/4	27.25	280.6	C	P	G	Sch.	Br.	—	F	—	1/4	115	34x3 1/2	Diaco	R
Lambert 99	—	—	5	1250	L	L	4 1/4 x 5 1/4	43.80	297.8	C	P	P	Sch.	Remy	—	F	—	—	112	34x3 1/2	—	R
Lenox Four	2	\$2100	5	2000	L	B	4 1/4 x 5 1/4	28.90	312.0	C	P	G	Sch.	Eise.	—	F	—	3	118	34x4 1/2	G. & D.	R
Lexington	—	—	5	1335	L	B	4 x 5	25.60	251.3	C	P	P	Sch.	A. K.	—	S	—	1/4	114	34x4	electric	L
Lozier Four	2	2100	7	2100	L	B	4 1/4 x 5 1/4	43.80	354.6	C	P	P	—	Bos.	—	D	—	4	120	36x4 1/2	G. & D.	L
Lyons-Knight K	—	—	5	2900	P	P	4 1/4 x 5 1/4	32.40	349.9	C	P	P	—	Sim.	—	S	—	3	130	37x5	N. East	L
Marathon Runner	2	925	5	975	L	L	3 1/2 x 4 1/4	19.60	173.2	S	T	G	Mar.	Remy	—	D	—	3	104	32x3 1/2	Jesco	R
Marathon Winner	2	1300	5	1325	L	L	4 1/4 x 4 1/4	28.90	255.3	S	S	T	Mar.	Remy	—	D	—	3	118	34x4	Jesco	R
Marathon Champion	2	1470	7	1495	L	L	4 1/4 x 5 1/4	32.40	326.1	S	T	G	Mar.	Remy	—	D	—	3	126	36x4	Jesco	R
Marion B	2	1650	5	1650	L	P	4 x 5	25.60	251.3	SP	P	T	Ray.	Spl.	—	S	—	3	117	34x4	West.	R
Marmon 32	2	2900	5	3000	T	P	4 1/4 x 5	32.40	318.1	P	P	T	Zen.	Bos.	—	C	—	3	120	35x4 1/2	N. East	L
Maxwell 25-4	—	—	5	750	L	B	3 1/2 x 4 1/4	20.25	185.8	SP	P	T	Zep.	Sim.	—	S	—	3	103	30x3 1/2	—	L
Maxwell 35-4	2	1200	5	1225	L	B	4 x 4 1/4	25.60	238.8	S	P	T	Hol.	Spl.	—	C	—	3	111	33x4	Decco	L
Mercer 35-J	2	2600	—	—	T	P	4 1/4 x 5	30.63	300.7	SP	P	P	Flet.	Bos.	—	D	—	4	108	32x4	—	R
Mercer 35-M	—	—	5	3000	T	P	4 1/4 x 5	32.40	318.1	SP	P	P	Flet.	Bos.	—	D	—	4	124	34x4	Rush	R
Mercer 35-H-O	2	2900	5	2900	T	P	4 1/4 x 5	32.40	318.1	SP	P	P	Flet.	Bos.	—	D	—	4	118	34x4	Rush	R
Meteor M-36	—	—	5	950	L	P	4 x 5	25.60	251.3	C	P	G	St.	Remy	—	D	—	3	116	34x3 1/2	Jesco	R
Meteor F-40	—	—	5	1725	L	P	4 x 5	25.60	251.3	C	P	P	St.	A. K.	—	S	—	3	115	34x3 1/2	Jesco	R
Metropol C	2	1475	4	1500	T	B	4 1/4 x 7 1/4	28.90	446.8	C	C	C	Ray.	Bos.	—	D	—	3	118	33x4	—	R
Metz 22	2	475	—	—	L	B	3 1/4 x 4	22.50	176.7	S	T	G	Hol.	Bos.	—	F	—	—	90	30x3	N. East	L
Mitchell Four	2	1595	5	1595	T	P	4 1/4 x 7	28.90	397.2	C	P	T	Ray.	Remy	—	S	—	3	120	36x4 1/2	Remy	L
Moline-Knight	—	—	5	2400	L	B	4 x 6	25.60	301.6	C	P	T	Sch.	Bos.	—	C	—	3	128	36x4 1/2	Wagner	L
Monarch 4	—	—	5	1050	L	B	3 1/2 x 5	16.27	159.6	C	T	P	Zep.	Spl.	—	S	—	3	110	32x3 1/2	Decco	L
Moon 42	2	1750	5	1750	T	P	4 1/4 x 5	32.40	318.1	S	P	P	St.	Del.	—	D	—	3	118	34x4	Delco	L
Morse D	2	3600	5	3600	I	S	4 1/4 x 5	34.25	336.0	S	P	P	St.	Eise.	—	D	—	4	127	36x4 1/2	G. & D.	R
Moyer E	2	2400	4	2500	T	P	4 1/4 x 5	32.40	318.1	P	P	G	Car.	Mea	—	C	—	3	120	34x4	U. S. L.	L
National 40	2	2750	5	3300	T	P	4 1/4 x 6	38.00	448.0	SP	P	P	Ray.	Bos.	—	C	—	3	120	36x4 1/2	G. & D.	L
Oakland 36	3	1150	5	1200	L	B	3 1/2 x 5	19.60	192.4	SP	P	P	Hol.	Del.	—	C	—	3	112	33x4	Delco	L
Oakland 43	—	—	5	1785	L	P	4 1/4 x 5 1/4	28.90	297.8	SP	P	P	St.	Del.	—	C	—	3	116	35x4 1/2	Delco	L
Overland 79	2	1075	5	1075	L	S	4 1/4 x 4 1/4	27.25	240.5	SP	T	G	Sch.	Spl.	—	C	—	3	114	33x4	G. & D.	R
Paige 25	3	975	5	975	L	B	3 1/4 x 4	22.50	176.7	SP	T	G	May.	Bos.	—	D	—	3	110	32x3 1/2	Diaco	R
Paige 36	3	1275	5	1275	L	B	4 x 5	25.60	251.3	C	P	T	St.	Bos.	—	D	—	3	116	34x4	G. & D.	R
Partin-Palmer 38	—	—	6	975	I	B	—	—	—	SP	T	G	St.	Br.	—	C	—	1/4	115	32x3 1/2	Autolite	L
Paterson 32-33	2	1147	5	1197	L	B	3 1/4 x 5	19.60	192.4	SP	T	G	Mar.	Conn.	—	S	—	3	112	32x3 1/2	Autolite	L
Pathfinder Four	2	2175	5	2175	L	B	4 1/4 x 5 1/4	27.25	280.6	SP	T	G	Sch.	Eise.	—	C	—	3	120	35x4 1/2	G. & D.	R
Petrol 60	2	1025	—	—	L	P	4 1/4 x 4 1/4	32.40	302.2	—	P	—	St.	Remy	—	—	—	—	116	34x3 1/2	—	R
Petrol 85	—	—	5	1275	L	P	4 1/4 x 4 1/4	32.40	302.2	—	P	—	St.	Remy	—	—	—	—	118	35x4	—	R
Pilot 50	2	2250	5	2250	T	B	4 1/4 x 6	32.40	381.7	S	P	P	Opt.	Eise.	—	C	—	3	126	37x4 1/2	G. & D.	R
Pope-Hartford 35	—	—	5	2250	I	P	—	—	—	SP	P	P	Own	Bos.	—	C	—	4	118 1/2	36x4 1/2	G. & D.	R
Pratt 4-50	2	2100	5	2150	L	P	4 1/4 x 5 1/4	32.40	365.8	S	P	P	Hol.	Bos.	—	D	—	3	122	36x4	G. & D.	R
Pullman 4-36	2	1775	5	1775	T	P	4.06x5	26.38	259.2	SP	P	G	St.	Bos.	—	C	—	3	118	34x4	West.	L
Pullman 4-44	2	1975	5	1975	T	P	4 1/4 x 5 1/4	30.63	330.7	SP	P	G	St.	Bos.	—	C	—	3	122	36x4	West	L
Read 30	—	—	5	850	L	B	3 1/2 x 4	19.60	153.9	S	T	G	St.	Bos.	—	D	—	3	115	32x3 1/2	—	L
Regal T, N, NC.	2	1125	5	1125	B	B	3 1/2 x 4 1/4	22.50	198.8	SP	T	G	Sch.	Mich.	—	C	—	3	108	32x3 1/2	Rush	L
Regal C	—	—	5	1350	L	B	4 x 5	25.60	251.3	SP	T	G	Sch.	Mich.	—	C	—	3	116	34x4	Rush	L
Reo the Fifth	2	1175	5	1175	L	P	4 x 4 1/4	25.60	226.2	P	P	G	Hol.	Remy	—	D	—	3	112	34x4	Remy	L
Richmond R	2	1150	5	1250	L	B	4 1/4 x 5	27.25	267.3	S	P	G	King	Mich.	—	C	—	3	114	34x4	Jesco	R
Richmond S	—	—	5	1350	L	S	4 1/4 x 5	32.40	318.1	S	P	G	King	Mich.	—	C	—	3	117	34x4	Jesco	R
Saxon	2	395	—	—	L	B	2 3/4 x 4	11.00	180.2	S	T	G	—	A. K.	—	D	—	2	96	28x3	—	R
Selden 49	2	2500	5	2500	L	P	4 1/4 x 6	36.10	354.4	S	P	P	St.	Bos.	—	D	—	3	125	36x4	G. & D.	R
S. G. V.	2	3500	5	3500	L	B	3 1/2 x 6	22.50	265.0	P	P	P	Zen.	Bos.	—	D	—	4	120	35x4 1/2	U. S. L.	L
Simplex 38	—	—	5	5600	T	P	4 1/4 x 6 1/4	38.00	485.3	C	P	P	Own	Bos.	—	D	—	4	137	35x5	Rush	R
Simplex 56	—	—	5	6100	T	P	5 1/4 x 6 1/4	46.00	590.0	C	C	C	Own	Bos.	—	D	—	4	137	36x4 1/2	Rush	R
Simplex 75	—	—	5	—	T	P	5 1/4 x 6 1/4	46.00	590.0	C	P	P	Own	Bos.	—	D	—	4	129	—	Rush	R
Spaulding 40	—	—	5	1875	L	B	4 1/4 x 5 1/4	28.90	312.0	SP	P	P	Hol.	Sim.	—	C	—	3	120	36x4	Entz	L
Spoerer 40	2	3000	5	3000	T	P	4 1/4 x 5 1/4	38.00	410.6	P	P	P	St.	Bos.	—	C	—	3	120	37x4 1/2	G. & D.	R
Staver 45-A	—	—	5	1885	T	B	4 1/4 x 6	32.40	381.7	S	P	P	Ray.	Sim.	—	C	—	3	120	34x4	G. & D.	R
Stearns-Knight Four	2	3750	5	3750	L	—	4 1/4 x 5 1/4	28.90	312.0	C	P	P	St.	Bos.	—	D	—	3	121	36x4 1/2	Estelina	L
Studebaker Four	2	1200	5	1050	L	B	3 1/2 x 5	19.60	192.4	S	P	G	Sch.	Remy	—	C	—	3	108	32x3 1/2	Wagner	L
Stutz 4-E	—	—	6	2150	T	P	4 1/4 x 5 1/4	36.10	389.9	P	P	P	St.	Spl.	—	S	—	3	130	34x4 1/2	S-Remy	L
Stutz 4-E	2	2000	—	—	T	P	4 1/4 x 5 1/4	36.10	389.9	P	P	G	St.	Spl.	—	C	—	3	120	34x4 1/2	S-Remy	L
Tribune A	—	—	5	1600	L	B	4 1/4 x 5 1/4	28.90	312.0	C	P	G	St.	Bos.	—	D	—	3	118	34x4	—	L
Vellie 5	—	—	5	1500	L	P	4 x 5 1/2	25.60	276.5	S	T	G	St.	Bos.	—	D	—	3	113	34x4	G. & D.	L
Vellie 9	2	2000	5	2000	L	P	4 1/4 x 5 1/4	34.25	352.8	S	P	P	St.	Bos.	—	D	—	4	121	36x4	G. & D.	L
Vulcan	2	750																				

FIVE-PASSENGER FOURS.

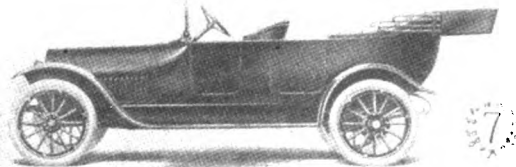
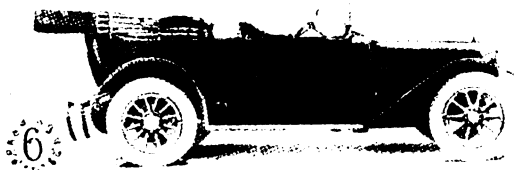
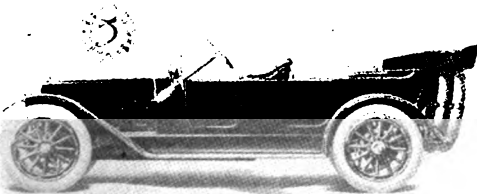
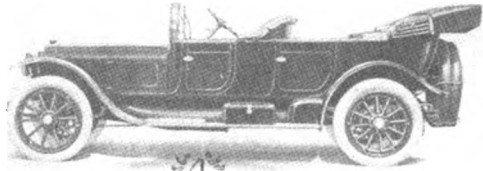
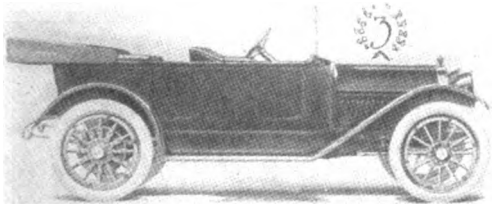
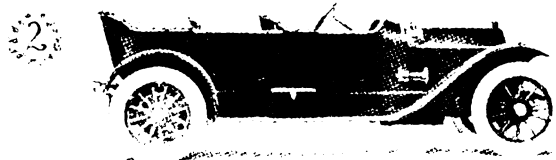
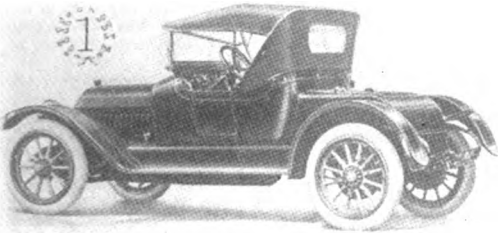
- 1—Moline-Knight; wheelbase, 128 inches; \$2400.
- 2—Regal Underlung T; wheelbase, 108 inches; \$1125.
- 3—Overland 79-T; wheelbase, 114 inches; \$950.
- 4—National Series V-3; wheelbase, 128 inches; \$3300.
- 5—Marmon 32; wheelbase, 120 inches; \$3000.
- 6—Haynes 28; wheelbase, 118 inches; \$1985.
- 7—White 30; wheelbase, 110 inches; \$2500.
- 8—K-R-I-T; wheelbase, 108 inches; \$1050.
- 9—Maxwell 25-4; wheelbase, 103 inches; \$750.
- 10—Reo the Fifth; wheelbase, 112 inches; \$1175.
- 11—Cartecar 5A; wheelbase, 116 inches; \$1700.



SPECIFICATIONS OF 1914 SIX-CYLINDER CARS.

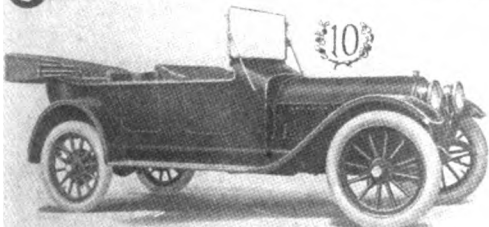
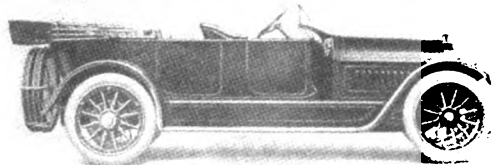
Key to Abbreviations: Cylinder type—L, valves in the head; T, L head; T, T head. How cast—B, en bloc; P, in pairs; S, separately; T, in triplets. Lubrication—C, combination; P, pressure; S, splash; SP, splash with pump circulation. Cooling—A, air; P, pump; T, thermo-siphon. Fuel feed—G, gravity; P, pressure. Carburetor—Car, Carter; Flat, Fletcher; Hol, Holley; King, Kingdon; Mar, Marvel; May, Mayer; New, Newcomb; PL, Planhard; Ray, Rayfield; Sch, Schaebler; St, Stromberg; Zen, Zenith; Zep, Zephyr. Ignition—A. K., Atwater Kent; Bos, Bosch; Br, Briggs; Conn, Connecticut; Del, Delco; Eise, Eise-mann; King, Kingston; Mich, Michigan; Nat, National; Sim, Simms; Spl, Splittorf; West, Westinghouse. Clutch—C, cone; CB, contracting band; D, disc; EB, expanding band. Transmission—F, friction; PL, planetary; Pr, progressive; S, selective. Rear axle—D, dead; F, full floating; 1/2, semi-floating; 3/4, three-quarter floating. Starting and lighting—G. & D., Gray & Davis; Leece-N., Leece-Neville; N. East, Northeast; Rush, Rushmore; Ward-L., Ward Leonard; West, Westinghouse. Driver—L, left; R, right; O, optional.

Make and Model	Roadster		Touring		Cyl. Type	How cast	Bore and Stroke	S. A. E. H. P.	Piston Displacement	Lubrication	Cooling	Fuel Feed	Carburetor	Ignition	Clutch	Transmission	Speeds	Rear Axle	Wheelbase	Tires	Lighting and Starting	Driver		
	Seats	Price	Seats	Price																				
Abbott-Detroit Belle Isle	2	\$2190	7	\$2190	L	T	3 1/4 x 5 1/2	33.75	347.8	SP	P	P	Zen.	Bos.	D	C	S	4	F	130	35x4 1/2	Autolite	L	
American 644	2	2750	4	2750	T	B	4 1/4 x 5 1/2	43.80	468.0	S	P	P	Ray.	Eise.	C	C	S	4	F	132	38x4 1/2	Disco	R	
American 646	—	—	6	2950	T	B	4 1/4 x 5 1/2	43.80	468.0	S	P	P	Ray.	Eise.	C	C	S	4	F	140	38x4 1/2	Disco	R	
Apperson 6-45	2	2200	—	—	T	B	3 1/4 x 5 1/2	33.75	364.4	SP	P	P	Ray.	Mea	CB	C	S	3	F	120	36x4	electric	R	
Apperson 6-45	—	—	5	2200	L	B	3 1/4 x 5 1/2	33.75	364.4	SP	P	P	Ray.	Mea	CB	C	S	3	F	128	36x4	electric	R	
Auburn 6-45	2	2000	—	—	L	P	3 1/4 x 5 1/2	33.75	347.8	S	P	P	Ray.	Sim.	C	C	S	3	F	130	37x4 1/2	Remy	L	
Auburn 6-46	—	—	6	2100	L	T	3 1/4 x 5 1/2	33.75	347.8	S	P	P	Ray.	Sim.	C	C	S	3	F	130	37x4 1/2	Remy	L	
Austin 55	2	4000	5	5000	T	T	4 x 5 1/2	38.40	414.7	S	P	P	—	—	—	—	S	4	F	141 1/2	37x5	Remy	L	
Austin 77	2	6000	7	6000	T	T	4 1/2 x 7	48.60	667.9	S	P	P	—	—	—	—	S	4	F	141 1/2	37x5	Remy	L	
Benham 14-48	—	—	7	3500	L	T	3 1/2 x 5 1/2	33.75	347.8	S	P	P	Ray.	Bos.	D	C	S	4	F	130	34x4 1/2	Rush	L	
Buick B-55	—	—	5	1985	I	P	3 1/2 x 5	33.75	331.4	SP	P	P	Mar.	Del.	C	C	S	3	F	130	36x4 1/2	Delco	L	
Chadwick 19	2	5500	—	—	L	P	5 x 6	60.00	706.8	P	P	P	Own	Bos.	EB	S	4	D	112	36x4 1/2	West.	R		
Chadwick 19	—	—	5	5500	L	P	5 x 6	60.00	706.8	P	P	P	Own	Bos.	EB	S	4	D	112	36x4 1/2	West.	R		
Chalmers 24	3	2175	5	2175	T	B	4 x 5 1/2	38.40	414.7	C	P	P	Ray.	Bos.	D	D	S	3	F	132	36x4 1/2	C-Entz	L	
Chalmers 26	2	2050	5	1800	T	B	3 1/2 x 5 1/2	29.40	317.4	C	P	P	Ray.	A. K.	D	D	S	3	F	126	34x4	C-Entz	L	
Chandler Six	—	—	5	1785	L	T	3 1/2 x 5	27.40	268.4	SP	P	P	St.	Bos.	D	D	S	3	F	120	34x4	West.	L	
Colby 6 C	2	2500	7	2500	L	P	4 1/4 x 5 1/2	40.90	420.9	S	P	P	Ray.	Eise.	D	C	S	3	F	136	37x5	G. & D.	L	
Cole Six	2	2600	6	2600	L	P	4 1/4 x 5 1/2	43.80	446.7	S	P	P	St.	Del.	C	C	S	3	F	136	36x4 1/2	Delco	L	
Correja H	—	—	6	2100	L	T	3 1/2 x 5 1/2	33.75	364.4	S	P	P	Zen.	Sim.	C	C	S	3	F	128	34x4	Ward-L.	L	
Crane 4	—	—	8000*	—	L	B	4 1/2 x 6 1/2	45.95	563.7	S	P	P	New.	Bos.	D	C	S	4	F	136 1/2	36x4 1/2	Rush	L	
Crescent Royal	2	1985	5	1985	T	B	4 x 6	38.40	452.4	SP	P	P	Opt.	Spl.	D	D	S	4	F	132	35x4 1/2	Jesco	L	
Crow Elk-Hart D 62	2	2250	5	2250	L	B	3 1/2 x 5 1/2	33.75	364.4	SP	T	G	Sch.	—	D	D	S	3	F	130	36x4	Briggs	L	
Davis 6-50	—	—	6	2185	L	P	3 1/2 x 5 1/2	33.75	347.8	SP	P	P	St.	Mea	D	D	S	4	F	128	37x4 1/2	G. & D.	L	
De Soto Six	—	—	5	2185*	L	P	4 x 5	38.40	376.9	C	P	P	Sch.	—	D	D	S	3	F	130	36x4	—	L	
Fiat 56	2	5000	7	5000	L	B	4 1/2 x 6	45.95	541.2	P	P	P	Own	Bos.	D	D	S	4	1/2	135	36x4 1/2*	West.*	L	
Franklin 6-30	3	2300	5	2300	I	S	3 1/2 x 5	33.75	331.4	C	P	P	Own	Eise.	D	D	S	3	1/2	120	34x4 1/2	F-Entz	L	
Havers Six-44	2	1985	5	1985	L	P	3 1/2 x 5	33.75	331.4	C	P	P	St.	Eise.	D	D	S	3	F	122	36x4	G. & D.	L	
Havers Six-60	2	2485	5	2485	L	P	4 1/2 x 5 1/2	40.90	420.9	P	P	P	St.	Eise.	D	D	S	3	F	128	36x4 1/2	G. & D.	L	
Haynes 26	2	2700	5	2700	L	P	4 1/2 x 5 1/2	43.80	468.0	SP	P	P	St.	Sim.	CB	*S	3	F	130	36x4 1/2	Leece-N.	L		
Haynes 27	—	—	7	2785	L	P	4 1/2 x 5 1/2	43.80	468.0	SP	P	P	St.	Sim.	CB	*S	3	F	136	36x4 1/2	Leece-N.	L		
Henderson Six	2	2285	5	2285	L	B	3 1/2 x 5 1/2	33.75	364.4	S	P	P	Car.	Eise.	C	C	S	3	F	126	35x4 1/2	Ward-L.	L	
Herronhoff 6-40	2	1850	5	1850	T	B	3 1/2 x 4 1/2	33.75	241.5	SP	T	G	St.	West.	C	C	S	4	1/2	124	34x4	West.	L	
Holly A-1	2	2750	5	2750	T	T	4 x 5	38.40	376.9	S	P	P	St.	Remy	C	C	S	3	1/2	130	35x4 1/2	Ward-L.	L	
Howard D	—	—	5	2375	L	T	4 1/2 x 5 1/2	40.90	420.9	C	P	P	St.	Bos.	C	C	S	3	F	130	36x4 1/2	Jesco	L	
Hudson 6-40	2	1950	—	—	L	T	3 1/2 x 5	29.40	288.6	C	P	P	Zen.	Del.	D	D	S	3	F	123	34x4	Delco	L	
Hudson 6-54	—	—	7	2250	L	T	4 1/2 x 5 1/2	40.90	420.9	SP	P	P	St.	Del.	D	D	S	4	F	135	36x4 1/2	Delco	L	
Imperial 44-6	—	—	5	2000	L	T	3 1/2 x 5 1/2	33.75	347.8	C	P	P	St.	Remy	D	D	S	3	F	126	36x4 1/2	N. East	L	
Imperial 54-6	—	—	7	2500	L	T	4 1/2 x 5 1/2	40.90	420.9	C	P	P	St.	Remy	D	D	S	3	F	137	36x4 1/2	N. East	L	
Jackson Sultanic	—	—	5	2150	L	P	4 1/2 x 4 1/2	40.90	380.8	C	P	P	Sch.	Remy	C	C	S	3	F	132	36x4 1/2	Autolite	L	
Jeffery Six	2	2250	5	2250	L	P	3 1/2 x 5 1/2	33.75	347.8	C	P	P	Ray.	Bos.	C	C	S	4	F	128	36x4 1/2	U. S. L.	L	
Keeton	2	3250	7	3250	L	B	4 x 5	38.40	376.9	—	C	P	—	Eise.	—	C	C	S	4	F	136	34x4 1/2	Jesco	L
Kissel-Kar 48	2	2350	5	2350	L	B	3 1/2 x 5 1/2	33.75	364.4	—	P	P	—	—	—	C	C	S	4	—	132	36x4 1/2	electric	L
Kissel-Kar 60	2	3150	7	3150	L	B	4 1/2 x 5 1/2	48.60	501.0	SP	P	P	—	—	—	C	C	S	4	—	142	37x5	electric	L
Kline-Kar 6-50	2	2585	5	2585	T	P	4 1/2 x 5 1/2	40.90	441.0	C	P	P	St.	Bos.	C	C	S	4	F	128	37x4 1/2	Rush	L	
Kline-Kar 6-60	2	2985	7	2985	T	P	4 1/2 x 5 1/2	44.88	503.8	C	P	P	St.	Bos.	C	C	S	4	F	133	37x5	Rush	L	
Knox 46	2	4500	7	4500	I	P	4 1/2 x 5 1/2	45.95	496.0	C	P	P	Scott	Bos.	D	D	S	3	F	134	38x5	Esterline	L	
Knox 66	—	—	7	5000	I	P	5 x 5 1/2	60.00	647.8	C	P	P	St.	Bos.	D	D	S	3	F	134	38x5 1/2	Esterline	L	
Lenox 6	—	—	6	2750	T	T	4 x 5	38.40	377.0	C	P	P	Own	Eise.	C	C	S	3	1/2	130	34x4 1/2	G. & D.	L	
Lewis Six	—	—	6	1600	L	B	3 1/2 x 5	29.40	346.4	C	P	P	—	—	—	D	D	S	3	F	135	36x4	Entz	L
Locomobile 38 L D	2	4400	5	4400	T	P	4 1/2 x 5	43.80	425.4	P	P	P	Own	Bos.	D	D	S	4	F	128	36x5	G. & D.	L	
Locomobile 38 R D	2	4400	5	4400	T	P	4 1/2 x 5	43.80	425.4	C	P	P	Own	Bos.	D	D	S	4	F	132	36x5	G. & D.	L	
Locomobile 48 L D	2	5100	7	5100	T	P	4 1/2 x 5 1/2	48.60	524.8	C	P	P	Own	Bos.	D	D	S	4	F	140	36x5	G. & D.	L	
Locomobile 48 R D	2	5100	7	5100	T	P	4 1/2 x 5 1/2	48.60	524.8	C	P	P	Own	Bos.	D	D	S	4	F	136	36x4 1/2*	G. & D.	L	
Lozier	2	3250	5	3250	L	T	3 1/2 x 5 1/2	36.06	389.1	SP	P	P	Ray.	Bos.	D	D	S	3	F	127 1/2	36x4 1/2	G. & D.	L	
Laverne	—	—	7	2500	L	P	4 x 5	38.40	377.0	S	T	G	Ray.	Bos.	D	D	S	3	F	120	36x4 1/2	—	L	
Marion G	2	2150	5	2150	L	T	3 1/2 x 5 1/2	33.75	347.8	P	P	P	Ray.	Spl.	D	D	S	3	F	124	35x4 1/2	West.	L	
Marmon 41	2	3200	5	3200	L	T	4 1/2 x 5 1/2	43.80	468.0	P	P	P	Zen.	Bos.	C	C	S	3	F	132	35x5	N. East	L	
Marmon 48	2	5000	5	5000	T	P	4 1/2 x 6	48.60	572.5	P	P	P	Zen.	Bos.	C	C	S	3	F	145	36x4 1/2*	N. East	L	
Maxwell 50-6	—	—	5	1975	L	B	4 1/2 x 4 1/2	40.90	380.8	SP	P	P	Ray.	Spl.	C	C	S	3	F	130	36x4 1/2	G. & D.	L	
McFarlan T	2	2590	5	2590	T	B	4 x 6	38.40	452.4	S	P	P	St.	Mea	D	D	S	3	F	128	36x4 1/2	—	L	
McIntyre	—	—	5	1485	T	B	3 1/2 x 5 1/2	29.40	299.8	SP	T	G	St.	—	—	D	D	S	4	F	120	34x4 1/2	electric	R
Meteor W 6-45	—	—	5	1600	L	P	3 1/2 x 5	33.75	331.4	C	P	P	St.	A. K.	D	D	S	3	1/2	122	35x4	Jesco	L	
Mitchell Little Six	2	1895	5	1895	T	P	4 1/2 x 6	43.80	510.6	C	P	P	Ray.	Remy	C	C	S	3	F	132	36x4 1/2	Remy	L	
Mitchell Big Six	—	—	7	2150	T	P																		



REPRESENTATIVE SIXES.

- 1—Premier 6-48 Roadster; wheelbase, 132 inches; \$2785.
- 2—Stutz 6-E Six-Passenger; wheelbase, 130 inches; \$2250.
- 3—Imperial 44-6 Five-Passenger; wheelbase, 126 inches; \$2000.
- 4—Peerless 48-6 Seven-Passenger; wheelbase, 137 inches; \$5000.
- 5—KisselKar 60-6 Seven-Passenger; wheelbase, 142 inches; \$3150.
- 6—Abbott-Detroit Belle Isle; wheelbase, 130 inches; \$2290.
- 7—Studebaker Six Seven-Passenger; wheelbase, 121 inches; \$1575.
- 8—Cole Six Seven-Passenger; wheelbase, 136 inches; \$2600.
- 9—Pierce-Arrow 38 Five-Passenger; wheelbase, 132 inches; \$4300.
- 10—Auburn 6-46 Six-Passenger; wheelbase, 130 inches; \$2100.
- 11—Austin 66 Seven-Passenger; wheelbase, 141¼ inches; \$4000.



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Make and Model	Roadster		Touring		Cyl. Type	How cast	Bore and Stroke	S. A. E. H. P.	Piston Displacement	Lubrication	Cooling	Fuel Feed	Carburetor	Ignition	Clutch	Transmission	Speeds	Rear Axle	Wheelbase	Tires	Lighting and Starting	Driver
	Seats	Price	Seats	Price																		
Oakland 6-48	2	\$1785	5	\$1785	L	B	3½x5	29.40	288.6	SP	P	P	St.	Del.	C	S	3	F	123½	35x4½	Delco	L
Oakland 6-60	—	—	5	2450	L	P	4½x4¾	40.90	370.8	SP	P	P	St.	Del.	C	S	3	F	130	34x4½	Delco	R
Oldsmobile D-54	—	—	7	3150	L	P	4½x5½	43.80	446.7	S	P	P	St.	Del.	C	S	3	F	132	36x5	Delco	R
Packard 2-38	2	3750	7	3850	L	T	4 x 5½	38.40	414.7	P	P	P	Own	Bos.	D	Pr	3	½	140	36x4½	Bijur	L
Packard 4-48	2	4750	7	4850	L	T	4½x5½	48.60	520.8	P	P	P	Own	Bos.	D	Pr	3	½	144	37x5	Bijur	L
Palmer-Singer Brighton Six	2	2495*	5	2495*	T	T	4 x 5½	38.40	414.7	SP	P	P	C.R.G.	West.	D	S	3	F	134	36x4½	West.	L
Palmer-Singer Magic 40	—	—	6	3250	—	T	3¾x4¾	27.40	292.9	C	P	P	C.R.G.	Bos.	D	S	4	F	134	36x4½	West.	—
Palmer-Singer Magic 60	—	—	6	3250	—	T	4 x 5½	38.40	424.2	C	P	P	C.R.G.	Bos.	D	S	4	F	140	36x4½	West.	—
Pathfinder Leather Stocking	—	—	7	2750	L	T	4½x5½	40.90	420.9	C	P	P	Sch.	Mea	D	S	4	F	135	35x5	G. & D.	L
Pathfinder Daniel Boone	2	2222	5	2222	L	T	3¾x5½	33.75	347.8	SP	P	P	Sch.	—	D	S	4	F	125	34x4½	electric	L
Peerless 38-6	2	4300	5	4300	T	P	4 x 5½	38.40	414.7	S	P	P	Own	Bos.	EB	S	4	F	125	36x4½	G. & D.	O
Peerless 48-6	2	4800	7	5000	T	P	4½x6	48.60	572.5	S	P	P	Own	Bos.	EB	S	4	F	137	36x4½	G. & D.	O
Peerless 60	2	5850	7	6000	T	P	5 x 7	60.00	824.8	S	P	P	Own	Bos.	EB	S	4	F	140	38x5½	G. & D.	O
Pierce-Arrow 38 C-2	2	4300	5	4300	T	P	4 x 5½	38.40	414.7	P	P	G	Own	Bos.	C	S	4	½	132	36x4½	P-West.	R
Pierce-Arrow 48 B-2	2	4850	5	4850	T	P	4½x5½	48.60	524.8	P	P	G	Own	Bos.	C	S	4	½	142	37x5	P-West.	R
Pierce-Arrow 66 A-2	2	5850	5	5850	T	P	5 x 7	60.00	824.8	P	P	G	Own	Bos.	C	S	4	½	140	37x5*	P-West.	R
Pilot 60	2	2785	5	2785	T	B	4½x6	48.60	572.5	S	P	G	Opt.	Eise.	C	S	3	F	132	37x4½	G. & D.	O
Pilot 75	2	2885	6	2885	T	B	4 x 6	38.40	452.4	S	P	G	Opt.	Eise.	C	S	3	F	132	37x4½	G. & D.	O
Premier Six	2	—	5	—	I	B	3¾x5½	31.60	340.7	C	P	P	Car.	Eise.	D	S	3	F	132	36x4½	Remy	L
Premier 6-48	2	2785	5	2785	T	T	4 x 5½	38.40	414.7	C	P	P	Car.	Eise.	D	S	3	½	132	36x4½	Remy	L
Pullman 6-46	2	2250*	5	2250*	L	T	3¾x5½	33.75	347.8	C	P	G	—	Bos.	C	S	4	F	130	36x4½	West.	L
Pullman 6-66	2	2850	5	2850	T	P	4½x5½	45.95	496.1	SP	P	G	St.	Bos.	D	S	4	F	138	37x5	West.	L
Rayfield D	2	2600	5	2600	L	B	4 x 5½	38.40	414.7	P	T	P	Ray.	Mea	D	S	4	F	130	36x4½	—	R
Republic E	—	—	5	2950	T	P	4½x5	43.80	425.4	C	P	P	Car.	Del.	C	S	4	F	132	36x4½	Delco	L
Richmond T	—	—	5	1500	L	S	4 x 4½	38.40	339.3	S	P	G	King	Mich.	C	S	3	½	123	34x4	Jesco	L
Speedwell H	—	—	5	2850	L	T	4½x5½	40.90	420.9	SP	P	P	St.	Bos.	D	S	3	F	135	37x5	Wagner	L
Speedwell Rotary	—	—	5	2850	—	T	4½x5½	40.90	420.9	P	P	P	St.	Sim.	D	S	3	F	135	36x4½	Wagner	L
Staver 65-A	—	—	7	2550	T	B	4 x 6	38.40	452.4	S	P	P	Ray.	Bos.	D	S	4	F	138	37x4½	Esterline	L
Stearns-Knight Six	2	4850	5	4850	—	P	4½x5½	43.80	489.4	C	P	P	St.	Bos.	D	S	4	F	140	37x5	G. & D.	R
Stevens-Duryea C-Six	2	5200	5	5750	L	P	4.31x5½	26.20	631.8	C	—	—	Own	Bos.	D	S	3	F	131	37x4½	*	R
Stevens-Duryea C-Six	—	—	7	6000	L	P	4.31x5½	26.20	631.8	C	—	—	Own	Bos.	D	S	3	F	138	37x5	*	R
Studebaker Six	2	1900	7	1575	L	B	3½x5	29.40	288.6	S	P	G	Sch.	Remy	C	S	3	F	121	34x4	S-Wagner	R
Stutz 6-E	—	—	6	2400	T	T	4 x 5	38.40	376.9	P	P	P	St.	Spl.	C	S	3	¾	130	34x4½	S-Remy	R
Stutz 6-E	2	2250	—	—	T	T	4 x 5	38.40	376.9	P	P	G	St.	Spl.	C	S	3	¾	120	34x4½	S-Remy	R
Touraine	2	3150	5	3150	T	T	4 x 5½	38.40	414.7	S	P	P	Flet.	Bos.	D	S	4	F	134	34x4½	G. & D.	L
Vaughan Six	2	2850	4	2750	L	B	3¾x5½	33.75	364.4	C	P	P	Ray.	Mea	D	S	4	F	138	35x4½	Bijur	L
Vellie 6-50	2	2350	5	2350	L	T	3¾x5½	33.75	347.8	C	P	P	St.	Bos.	D	S	4	F	126	37x4½	G. & D.	L
Westcott 6-60	2	2485	7	2535	L	B	4 x 6	38.40	452.4	—	—	—	Ray.	Bos.	C	S	3	—	128	37x4½	Jesco	R
White 60	2	4800	5	5000	L	B	4½x5½	43.80	489.4	C	P	G	Own	Bos.	D	S	4	—	132	37x5	W-Entz	L
Winton	2	3250	5	3250	L	P	4½x5½	48.60	524.8	C	P	G	St.	Opt.	D	S	4	F	130	36x4½	G. & D.*	R
Zimmerman	—	—	5	2185	L	P	4 x 5	38.40	376.9	S	P	P	Sch.	Remy	D	S	3	F	132	36x4	*	L

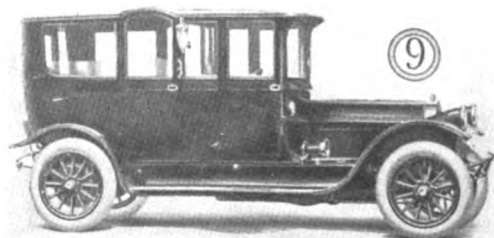
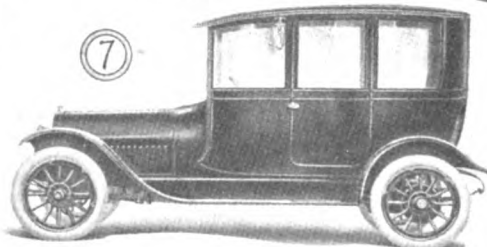
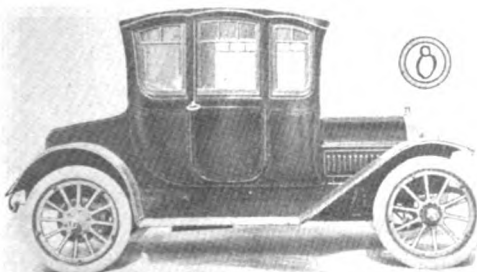
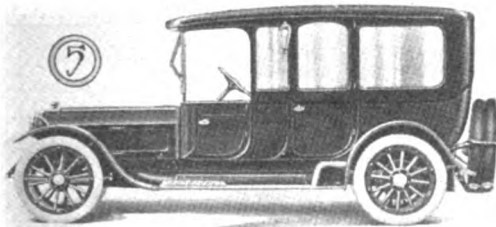
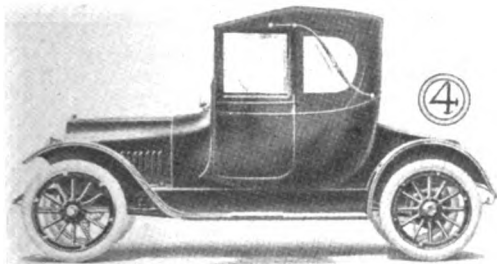
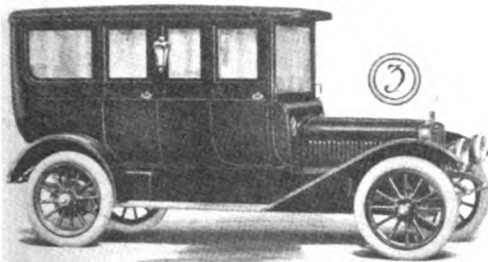
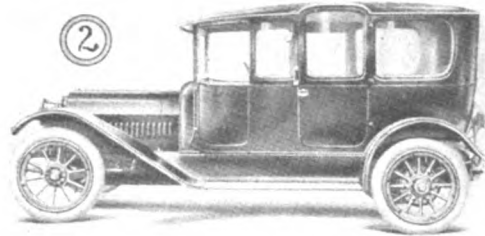
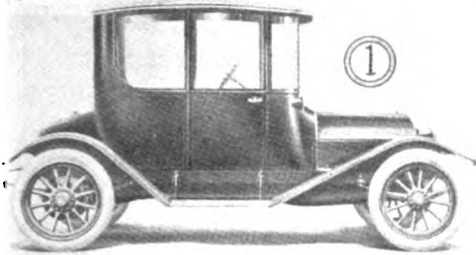
*Packard 2-38—Rear tires, 37x5. Palmer-Singer Brighton Six—Wire wheels extra. Peerless 48-6—Rear tires, 37x5. Pierce-Arrow 66—Rear tires, 38x5½. Pullman—Wire wheels extra; electric gearshift. Stevens-Duryea—Electric lights, air starter. Stutz—Special rear axle. Winton—Electric lights, air starter. Zimmerman—Electric lights, optional starter.

SIX-CYLINDER LIMOUSINES.

Make and Model	Price	Seats	W. B.	Tires
Abbott-Detroit Belle Isle	\$3500	7	130	35x4½
Austin 77	7000	7	141	37x5
*Chadwick	6500	7	133	37x4½
Chalmers 24	3600	7	132	36x4½
Cole Six	4000	7	136	36x4½
Cunningham	4900	7	124	36x4½
Dorris I.	3000	7	121	36x4
Fiat 54	5000	7	123	36x4½
*Fiat 55	5500	7	128	36x4½
*Fiat 56	6000	7	135	36x4½
Franklin 6-30	3300	5	120	34x4½
Great Eagle B.	4000	7	135	37x5
Great Eagle B.	4250	10	135	37x5
Haynes 27	3850	7	136	36x4½
Jeffery Six	3700	5	128	36x4½
KisselKar 48-6	4100	7	132	36x4½
KisselKar 60-6	4900	7	142	37x5
Locomobile 38LD	5400	7	132	36x5

*Locomobile 48LD	6200	7	140	36x4½
Lozier	4450	6	127½	36x5
Marmon 41	4750	7	132	35x5
*Marmon 48	6250	7	145	36x4½
McFarlan T.	4000	7	128	36x4½
Norwalk D.	4000	6	131	37x4
Norwalk C.	5000	6	136	39x5
Oldsmobile 54	4300	7	132	36x5
*Packard 2-38	4950	6	140	37x4½
*Packard 2-38	5000	7	140	37x4½
*Packard 4-48	6100	6	144	37x4½
*Packard 4-48	6150	7	144	37x4½
Peerless 38	5300	7	125	36x4½
*Peerless 48	6000	7	137	36x4½
Peerless 60	7000	7	140	38x5½
S. G. V. F.	4250	7	120	35x4½
Stearns-Knight Six	6100	7	140	37x5
Stevens-Duryea C-6	5800	7	131	37x5
Stevens-Duryea C-6	6000	7	138	37x5
White 60	6300	7	132	37x5
*Winton	4350	7	130	36x4½
Winton	4600	7	130	36x4½

*All except Winton—Rear tires, 37x5. Winton—Three-quarter limousine.



ENCLOSED CAR TYPES.

- 1—Overland Coupe 79C; Four; wheelbase, 114 inches; \$1550.
- 2—Haynes Limousine 27; Six; wheelbase, 136 inches; \$3850.
- 3—Winton Limousine 20; Six; wheelbase, 130 inches; \$4600.
- 4—Studebaker Landau Roadster; Six; wheelbase, 121; \$1950.
- 5—Peerless Limousine 60-6; Six; wheelbase, 140 inches; \$7000.
- 6—Haynes Coupe 28; Four; wheelbase, 118 inches; \$2700.
- 7—Studebaker Sedan; Six; wheelbase, 121 inches; \$2250.
- 8—Cartecar Coupe 5C; Four; wheelbase, 116 inches; \$1900.
- 9—Pierce-Arrow Vestibuled Suburban 66; Six; wheelbase, 147½ inches; \$7300.

FOUR-CYLINDER LIMOUSINES.

Make and Model	Price	Seats	W. B.	Tires
Abbott-Detroit 34-40.....	\$3150	7	121	36x4½
Austin 55.....	5000	7	141	37x5
*Cadillac.....	2800	5	120	36x4½
Cadillac.....	3250	7	120	36x4½
Jeffery Four.....	3000	5	116	34x4
Knox 44.....	4400	7	opt	36x4½
Knox 45.....	4700	7	126	37x5
Marmon 32.....	4000	7	120	35x4½
National 40.....	4800	7	132	36x4½
Simplex 38.....	6400	6	137	35x5
Simplex 38.....	6500	7	137	35x5
*Stearns-Knight Four.....	5000	7	127	36x4½
White 40.....	5000	7	120	36x4½

*Cadillac—Inside drive. Stearns-Knight Four—Rear tires, 37x5.

SIX-CYLINDER COUPES.

Make and Model	Price	Seats	W. B.	Tires
Chalmers 24.....	\$2850	3	132	36x4½
Cole Six.....	3000	4	136	36x4½
Franklin 6-30.....	2950	3	120	34x4½
Haynes 26.....	3200	4	130	36x4½
Henderson Six.....	2785	3	126	35x4½
*Hudson.....	1950	2	123	34x4
Kissel-Kar 48-6.....	3350	5	132	36x4½
Kline-Kar 6-60.....	2895	2	133	37x5
Kline-Kar 6-50.....	3200	2	128	37x4½
Locomobile 38LD.....	5200	3	132	36x5
Lozier.....	3850	3	127½	36x4½
Marion G.....	2650	4	124	35x4½
McFarlan T.....	3300	4	128	36x4½
Moon 6-50.....	2750	3	129	35x4½
National Six.....	2850	3	132	36x4½
Packard 2-38.....	4450	3	140	37x5
Packard 4-48.....	5450	3	144	37x5
Peerless 38-6.....	5000	3	125	36x4½
Rayfield D.....	2750	..	130	36x4½
Stearns-Knight Six.....	5550	4	134	37x5
*Stevens-Duryea C-6.....	5000	3	121	36x4½
Stutz 6-E.....	2850	3	120	34x4½
White 60.....	5400	3	132	37x5
Winton.....	4350	4	130	36x4½

*Hudson—Cabriolet. Stevens-Duryea—Coupelet.

FOUR-CYLINDER COUPES.

Make and Model	Price	Seats	W. B.	Tires
Abbott-Detroit 30-40.....	\$2250	4	116	34x4
Apperson.....	2350	4	116	34x4
Auburn 4-40.....	..	4	120	36x4
Bulck B38.....	1800	3	112	34x4
Cadillac.....	2500	3	120	36x4½
Cameron.....	1200	2	115	32x3½
Cartercar 5.....	1900	3	116	36x4
Cole Four.....	2350	3	120	34x4½
Dispatch.....	1000	2	120	36x3½
*Ford T.....	750	6	100	30x3
Haynes 28.....	2700	4	118	34x4
Henderson DeLuxe.....	2285	3	116	35x4½
Herreshoff 4-30.....	1650	2	110	32x3½
Hupmobile 32.....	1350	3	106	33x4
*Jeffery Four.....	1950	2	116	36x4
Kissel-Kar 40-4.....	2850	5	121	36x4
Kline-Kar 4-40.....	2585	2	120	36x4
Marion B.....	2150	4	117	34x4
Moon 42.....	2350	3	118	34x4
National 40.....	3500	3	132	36x4½
*Oakland.....	1585	2	112	33x4
Overland.....	1550	4	114	33x4
Paige 36.....	1850	4	116	34x4
*Pathfinder.....	2222	3	120	35x4½
Regal NC.....	1600	3	108	33x4
Stearns-Knight Four.....	4450	4	121	36x4½
Stutz 4-E.....	2600	3	120	36x4½

White 30.....	3250	3	110	34x4
White 40.....	4100	3	120	36x4½

*Ford—Town car, rear tires, 30x3½. Jeffery Four—All weather coupelet. Oakland—Cabriolet. Pathfinder—Coach.

SIX-CYLINDER LANDAULETS.

Make and Model	Price	Seats	W. B.	Tires
*Fiat 56.....	\$6100	7	135	36x4½
Knox 46.....	5550	7	134	38x5
Locomobile 38LD.....	5500	7	132	36x5
*Locomobile 38LD.....	6300	7	140	36x4½
Marmon 41.....	..	7	132	35x5
Marmon 48.....	6350	7	145	36x4½
*Packard 2-38.....	4900	6	140	36x4½
*Packard 2-38.....	4950	7	140	36x4½
*Packard 4-48.....	5900	6	140	37x5
*Packard 4-48.....	5950	7	140	37x5
Peerless 38-6.....	5400	7	125	36x4½
*Peerless 48-6.....	6100	7	137	37x5
Peerless 60-6.....	7100	7	140	38x5½
Pierce-Arrow 38.....	5200	7	opt	36x4½
Pierce-Arrow 48.....	5800	7	opt	37x5
*Pierce-Arrow 66.....	6800	7	opt	37x5
Stearns-Knight Six.....	6200	7	140	37x5
Winton.....	4600	7	130	36x4½

*All—Rear tires, one size larger.

FOUR-CYLINDER LANDAULETS.

Make and Model	Price	Seats	W. B.	Tires
Cunningham M.....	\$5000	7	124	36x4½
Fiat 54.....	5100	7	123	36x4½
*Fiat 55.....	5600	7	128	36x4½
Knox 44.....	4450	7	opt	36x4½
Knox 45.....	4750	7	126	37x5
Marmon 32.....	4100	7	120	35x4½
S. G. V., F.....	4250	7	120	35x4½
Simplex 38.....	6400	6	137	35x5
Simplex 38.....	6500	7	137	35x5
*Stearns-Knight Four.....	5100	7	127	36x4½

*Fiat and Stearns-Knight—Rear tires, 37x5.

SIX-CYLINDER SEDANS.

Make and Model	Price	Seats	W. B.	Tires
Franklin 6-30.....	\$3200	5	120	34x4½
Hudson 6-54.....	3100	5	135	36x4½
Jeffery.....	3250	5	128	36x4½
Marion G.....	2950	5	124	35x4½
Stearns-Knight Six.....	6100	5	134	37x4
Studebaker Six.....	2250	5	121	34x4

FOUR-CYLINDER SEDANS.

Make and Model	Price	Seats	W. B.	Tires
Apperson 4-45.....	\$2500	5	120	36x4
Jeffery.....	2350	5	124	35x4½
Lyons-Knight.....	3900	5	130	36x5
Paige 36.....	1950	5	116	34x4
*Stearns-Knight Four.....	5000	5	127	36x4½

*Rear tires, 37x5.

SIX-CYLINDER BERLINES.

Make and Model	Price	Seats	W. B.	Tires
*Fiat 56.....	\$6300	7	135	36x4½
Franklin 6-30.....	3400	5	120	34x4½
Peerless 38-6.....	5500	7	125	36x4½
Peerless 48-6.....	6200	7	137	37x5

Peerless 60-6.....	7200	7	140	36x5½
Stevens-Duryea C-6.....	6200	7	138	37x5

*Flat 56—Rear tires, 37x5.

FOUR-CYLINDER BERLINES.

Make and Model	Price	Seats	W. B.	Tires
Cunningham M.....	\$5000	7	124	36x4½
Fiat 54.....	5300	7	123	36x4½
*Fiat 55.....	5800	7	128	36x4½
Lyons-Knight	4300	7	130	36x5

*Fiat 55—Rear tires, 37x5.

SIX-CYLINDER MISCELLANEOUS.

Phaetons.				
Make and Model	Price	Seats	W. B.	Tires
Hudson 6-40.....	\$1750	6	123	34x4
Hudson 6-54.....	2250	7	135	36x4½
*Packard 2-38.....	3750	5	140	36x4½
*Packard 4-48.....	4750	5	144	37x5

Broughams.				
*Packard 2-38.....	4950	4	140	36x4½
*Packard 2-38.....	5000	6	140	36x4½
*Packard 4-48.....	5950	4	140	37x5
*Packard 4-48.....	6060	6	140	37x5
Pierce-Arrow 38.....	5200	5	opt	36x4½
Pierce-Arrow 48.....	5800	5	opt	37x5
*Pierce-Arrow 66.....	6800	5	opt	37x5

Vestibuled Broughams.				
Pierce-Arrow 38.....	5400	7	opt	36x4½
Pierce-Arrow 48.....	6000	7	opt	37x5
*Pierce-Arrow 66.....	7000	7	opt	37x5

Landaus.				
Pierce-Arrow 48.....	6100	7	opt	37x5
*Pierce-Arrow 66.....	7100	7	opt	37x5

Vestibuled Landaus.				
Pierce-Arrow 48.....	6300	7	opt	37x5
*Pierce-Arrow 66.....	7300	7	opt	37x5

Vestibuled Landaulets.				
Pierce-Arrow 38.....	5400	7	opt	36x4½
Pierce-Arrow 48.....	6000	7	opt	37x5
*Pierce-Arrow 66.....	7000	7	opt	37x5

Berline-Limousines.				
Locomobile 38LD.....	5700	7	132	36x5
*Locomobile 48LD.....	6500	7	140	36x5

Berline-Landaulets.				
Locomobile 38LD.....	5800	7	132	36x5
*Locomobile 48LD.....	6600	7	140	36x5

Suburbans.				
Pierce-Arrow 48.....	6100	7	opt	37x5
*Pierce-Arrow 66.....	7100	7	opt	37x5

Vestibuled Suburbans.				
Pierce-Arrow 48.....	6300	7	opt	37x5
*Pierce-Arrow 66.....	7300	7	opt	37x5

Landau-Phaetons.				
Stevens-Duryea C-6.....	5400	7	138	37x5
*Stevens-Duryea C-6.....	5400	7	138	37x5

Semi-Berline.				
Stevens-Duryea C-6.....	5750	7	131	37x5

Inside Drive.				
Vaughan	3800	6	138	38x4½

*All—Rear tires one size larger.

FOUR-CYLINDER MISCELLANEOUS.

Phaetons.				
Make and Model	Price	Seats	W. B.	Tires
Cadillac	\$1975	4	120	36x4½
Brougham.				
S. G. V., F.....	4500	5	120	36x4½

DECISION IS REVERSED.

Court of Appeals in France Takes Different View of Motorist's Rights.

Last November, a chauffeur who was driving his master's car, was approaching a small village in France when he noticed three men standing by the side of the road. Just as he was passing them one of the three suddenly stuck a long pole between the spokes of one of the wheels of the car, stopping it so suddenly that it was all the driver could do to keep his seat.

A few days later he was surprised to receive a summons, charging him with violence and exceeding the speed limits. Then he learned that the individual who had thrust the pole between the spokes of his wheel was no less a person than one of the municipal councillors of the village.

Naturally, the chauffeur claimed that the councillor had no right to take out a summons charging him with exceeding the speed limit, and still less to act in such manner as to endanger the lives of those using the highways. The court was not of this opinion, deciding that a private

citizen has a perfect right to stop a car in the manner in question when it is alleged to be travelling at an excessive speed. The case was appealed and the Amiens court of appeal has reversed the decision.

GRANT COMPANY'S OFFICERS.

Plans for Coming Year Include Material Increase in Production of Cars.

At the annual meeting of the Grant Motor Company at its new plant in Findlay, O., Feb. 10, the following directors were re-elected: D. Grant, Charles A. Grant, David A. Shaw, George S. Waite, George S. Salzman, James M. Howe, H. J. Koehler and A. Freschl. The officers are: President and treasurer, David A. Shaw; vice president, Herman J. Koehler; secretary and sales manager, George W. Waite; factory manager, George S. Salzman; engineer, James M. Howe.

The factory has been shipping an average of 20 cars a day, and plans have been perfected, under which this production will be greatly increased at once.

STATIC CONDITIONS IN IGNITION SYSTEMS.

MOTORISTS, when seeking to locate the cause of a baffling, intermittent miss, and when the components of the ignition system do not reveal any apparent fault, have noted when running the engine in the dark that the cause of the trouble was due to the high-tension current jumping from one of the secondary cables to nearby conducting material. And it is not unfrequent that an examination of the insulation does not reveal any chafed or broken places.

It is well known that the voltage of the initial or primary current must be built up so as to bridge the air gap between the electrodes of the spark plug, and that a high potential discharge is necessary to overcome this resistance. It is also a fact that anything which tends to retard this high potential discharge reduces the efficiency of

ter wheel, this wheel being connected with machinery, which requires considerable effort to start, but after once in motion, the actual effort required for operating purposes is less. The water tank is placed at a proper height to obtain the lower pressure; but to obtain the higher initial pressure—the one required to start the wheel—a pump is installed near the tank and so arranged that it will draw water from it, then force it to the water wheel at the required high pressure.

High and Low Pressures.

After the high pressure fluid is sent through the pipe, it is immediately followed by the lower or tank pressure, means being provided at the pump to accomplish this effect, as indicated in the drawings at Figs. 1 and 2. The pipe conducting the water from the pump to the wheel is of a

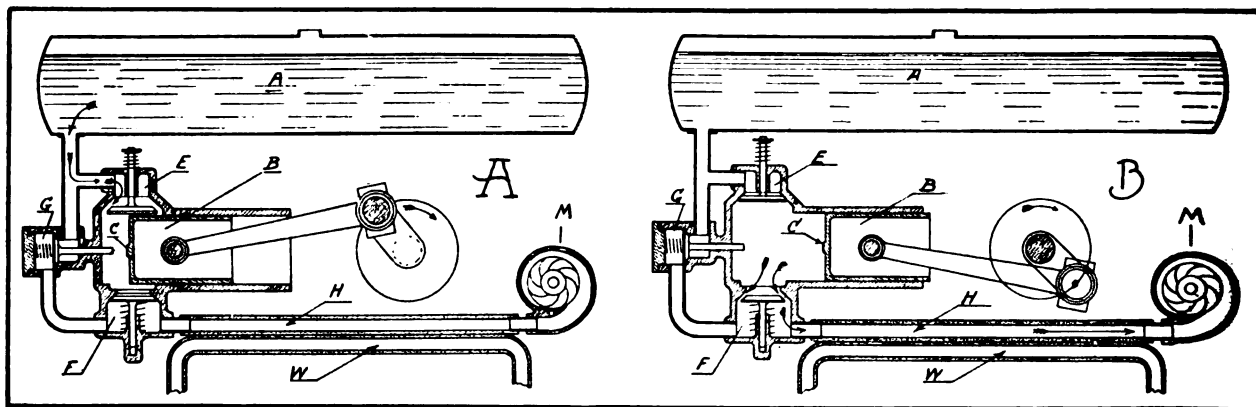


Fig. 1—Illustrating an Analogy Between Water Flow and High Voltage Discharges, insofar as They Affect and Apply to Ignition Systems.

the ignition system, as in the case of the jumping current cited, and results in a weak spark at the plug. In pronounced cases these conditions may cause missing or even back firing.

Static Conditions.

The Bosch Magneto Company explains some of these conditions in The Bosch News for February, and the data are based on the results of years of experience with high-tension ignition systems. Much of the misfiring and back firing is attributed to electrostatic charges and discharges, which are more commonly known as static conditions, being set up by the discharge of high potentials, or high voltage.

An explanation is made of electrostatic conditions, insofar as they apply to ignition systems, by drawing an analogy between water flow and high potential or high voltage discharges. For example: Suppose a pipe is to be used for the purpose of carrying water from a tank to a wa-

porous material, and has certain frictional irregularities which tend to retard the initial water flow. Consequently, a certain amount of the high pressure power will be used in satisfying the effects of the porous material and overcoming the frictional conditions, in order that the lower pressure flow or power will be uninterrupted.

The amount of water that can be absorbed by the porous pipe is called its capacity. If a second pipe of the same material be placed alongside the first pipe, so that their surfaces are in contact with each other, a further amount of water will be absorbed. If the porosity of this second pipe were sufficient, it would allow a quantity of water to be absorbed, great enough to cause an actual flow out of its end. If other bodies of a porous nature were brought into contact with these pipes, it would result in a large amount of the initial flow being necessary to satisfy this capacity or porosity, and would necessitate a higher

initial pressure at the pump, in order to obtain the same power at the water wheel as would be true if these conditions did not exist.

Porosity of Pipes.

It can be seen that this condition of porosity requires that a considerable amount of energy be uselessly expended, in order that the high initial pressure may be obtained, and therefore the amount of power exerted on the water wheel is not in proportion to that leaving the tank. The only method whereby the greatest efficiency could be obtained would be to have the pipe in which the water flows constructed of material which was not porous. If this were not possible, then it would be necessary to have the porosity of the pipe held down to the lowest degree possible, and to keep away from it other porous bodies, so as to prevent the possibility of absorption taking place. It would be necessary also to have the inside of the water pipe free from conditions which tend to create friction.

sufficient to cause the water wheel to start revolving, and a further outward movement of the crank will cause the boss C to engage the stem of the valve G. Fig. 2 D shows the valve G open, and the piston in such position that the valve F is blocked off. On account of the valve G being open, water will flow from the reservoir in the direction shown by the arrow, into the porous pipe H to the water wheel, and keep it revolving. This cycle of work takes place once in each revolution of the pump's crankshaft. The varying pressures that will result are shown by means of the curve at Fig. 3, a similar wave or curve being obtained from high-tension ignition systems.

Absorbing of Current.

The conditions explained are analogous to those in high-tension ignition circuits as employed on internal combustion automobile engines. Although the cable insulations in the true sense of the word are not porous, they have the ability to absorb an electrical charge, the same as

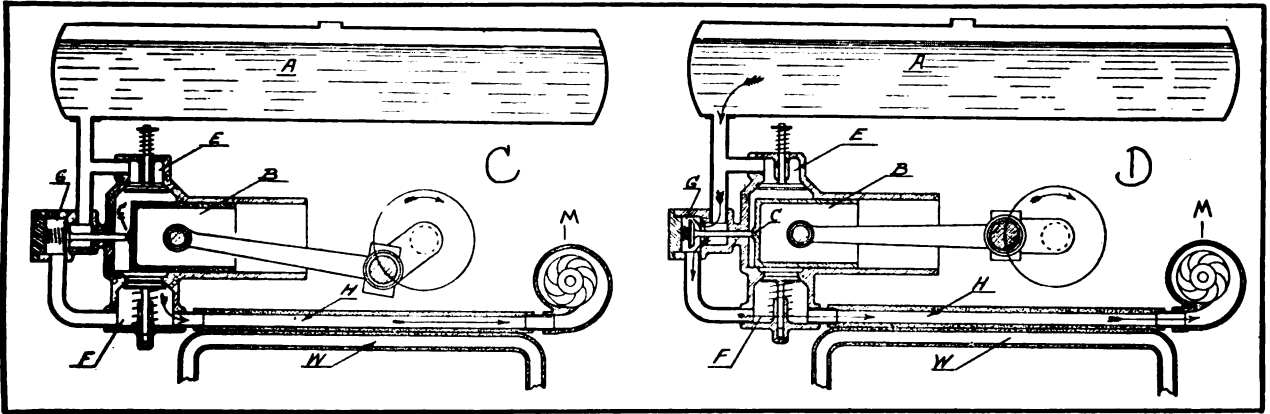


Fig. 2—Illustrating an Analogy Between Water Flow and High Voltage Discharges—The Low and High Pressures Are Utilized to Show the Dynamic Current and High Potential Discharge.

Figs. 1 and 2 show the four positions of a power plant, these being used to illustrate the various effects above described. The drawing at Fig. 1 A shows the relative position of the valves and piston of the pump, previous to operation. A is the tank, B the piston and E the inlet valve. The piston in travelling outward permits a quantity of water to be drawn from the tank. Valves G and F are closed. Fig. 1 B shows the position after the piston has drawn in the water, and is in the act of forcing it out through the valve F, thereby creating a high pressure in the porous pipe H. During this operation valves E and G are closed.

Varying Pressures.

Fig. 2 C gives the positions just at the completion of the high pressure period. Valves E and G are closed and the cylinder is practically empty of water, but the high pressure which was due to the movement shown at Fig. 1 B has been

a porous pipe absorbs water. This condition is also known as capacity, and the greater amount of dielectric, or insulating material, the greater the capacity.

In place of the high pressure water discharge there exists what is known as the high potential or high voltage discharge, and that which corresponds to the lower water pressure discharge is known as the dynamic or true amperage flow. At the instant that the high potential discharge is released from the magneto armature secondary winding and sent through the cable that is in connection with the spark plug, it results in this cable taking on or absorbing a part of the electrical charge. According to the laws of electricity, this charge is capable of causing other bodies to become charged when brought in surface contact with the cable that carries the high potential discharge. If other surfaces are in contact and no means are provided for discharging this static

condition, it may become sufficiently intense to cause a spark to occur in a cylinder that is not in a firing position. This results in back fires, and

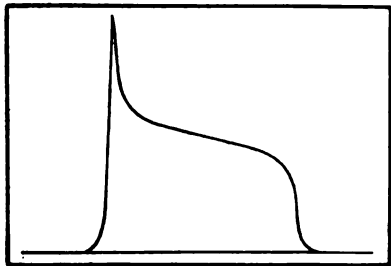


Fig. 3—Curve Showing Pressure Period in Pipe Line—A Similar Wave Is Obtained from High-Tension Ignition Systems.

sequence, if the magneto or ignition source does not supply an extremely high potential, there will not be sufficient energy to cause the current to bridge the gap at the electrodes of the spark plug.

High Potential Discharge.

The purpose of the high potential discharge is to bridge the gap and create a path over which the lower voltage or dynamic current can flow. This fact proves that anything which tends to retard the high potential discharge will tend to the detriment of the ignition system. The Bosch Magneto Company states that if ignition systems are installed so that the high-tension leads are twisted together, or are carried in a container that is insulated from the metal part of the motor, it will result in unsatisfactory operation.

The best results are held to be obtained when the individual cables are separated one from the other. If this is not feasible their surfaces must be given a perfect ground. The cable lengths should be as short as possible, loops or frequent twists about the parts of the motor or chassis avoided, also sharp bends or angular curves. Precaution should also be taken to prevent the possibility of chafing. This is very important.

Proper Insulation.

Relative to the thickness of the insulation: The average person believes that the thicker or heavier the insulation the less liability there will be of trouble. While this seems reasonable, states the Bosch company, yet added insulation increases the capacity of the cable and thus static conditions are considerably encouraged. Medium thickness and proper quality of insulation are important factors in the selection of cable for ignition purposes.

Wire Suspension.

The wiring arrangement shown at Fig. 4 A is recommended, the only drawback being the lia-

bility of the cables becoming disarranged or damaged, as the average space under the bonnet of a small car is limited. If the space permits of the arranging of the cables in a similar manner and the use of a metal covering, the method would be excellent. This system, a Bosch, is utilized by a number of manufacturers abroad. Fig. 4 B shows an installation somewhat similar to that at A, but it is possible to carry the wires more closely together, due to the fact that the surface of the cables are grounded at regular intervals. Lack of space, however, does not always permit of the installation.

From the above it will be seen that too much care cannot be given to the arrangement of the cables carrying the secondary current; that they should be well separated from one another, and means provided for discharging any existing static condition.

PAYMENT ON KRIT EXTENSION.

General Manager Reports Business of Company Is in a Prosperous Condition.

Announcement is made by the Krit Motor Car Company, Detroit, that the February payment on the extension, arranged some time ago, has been met. This is the first installment to fall due and its prompt payment is expected to still further place this concern in a position to take care of its rapidly increasing business. General Manager Howard Crawford has the following to say with respect to the condition of the Krit company:

We have never had so many orders on our books as now. At present we are working to bring our production to meet the big demand for Krit cars. After

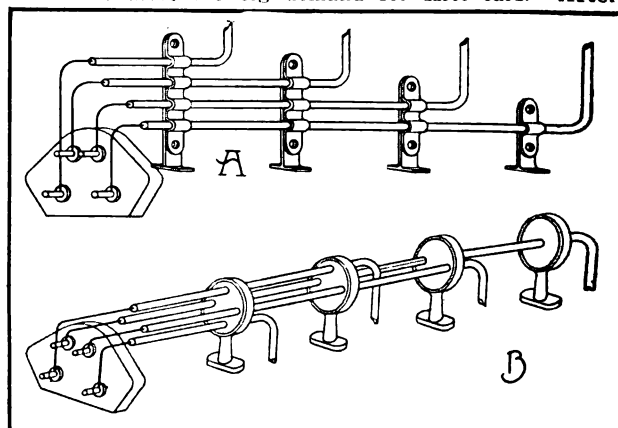
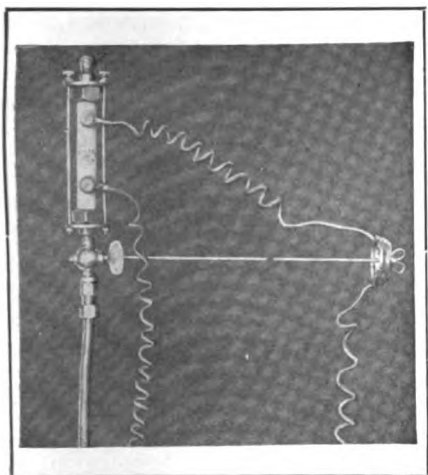


Fig. 4—Wiring to Prevent Static Conditions: A, Method Recommended and Used Abroad; B, Plan Not Always Possible Due to Lack of Space.

March 1 our output will easily be greater than ever before, with factory working at full capacity. Already, we are taking on more men, and in some departments are working nights.

DUELEC NUMBER 2.**An Electric Vaporizing Primer, Operated from Seat and Easily Installed.**

The effect of low temperatures on gasoline is well known to motorists, and with the present



Duelec Vaporizing Electric Primer.

grade of fuel difficulty in starting is more pronounced than formerly. The chief trouble experienced is that the fuel does not vaporize readily, resulting in too thin a mixture to ignite. And in low temperatures, priming the cylinders with raw fuel does not always obtain readily the desired results.

By raising the temperature of the fuel to a point where it vaporizes easily, starting is made easy, because the vapor mingles readily with the air, forming a homogeneous mixture—one that ignites quickly. This is the principle involved in the Duelec vaporizing primer No. 2, which is being marketed by the Duelec Vaporizing Primer Company, 14 North Broadway, Yonkers, N. Y. Instead of injecting raw fuel into the intake manifold or combustion chamber, the Duelec device heats the gasoline by electricity and to such a temperature that the results obtained are similar to those on a hot, summer's day.

The device is simple, very compact and easily installed. As will be noted by an accompanying illustration, the Duelec comprises a heating chamber in the form of a cylindrical porcelain or fibre, in which is incorporated a resistance coil. The last named is retained by two terminals to which the leads from the battery or other source of current supply are secured. Below the coil is a fuel valve or petcock, which, when opened, permits access of fuel from the main line.

This valve is controlled from the switch, push button, lever or other means of current control, the one operation opening the valve, admitting fuel, vaporizing it, and shutting off the valve and supply when the circuit is broken. This is performed from the seat with motor starters and in a similar manner when the engine is cranked. The

switch unit is connected by a rod having a universal joint, so that the control member may be placed as desired, making for convenience.

The installation is a simple matter. An .125-inch hole is drilled and tapped in the intake manifold and the Duelec attached. The main line is also tapped and a pipe led from it to the Duelec by means of a solderless tee connection. The control rod and switch member are then fitted, and the wires attached. One of the qualities of the Duelec is that it may be inverted to facilitate installation. It is stated that it requires but little current to vaporize the fuel, and that ignition cannot take place, as the coil cannot overheat the fuel. The Duelec is moderately priced.

RUSCO SPECIALTIES.**Russell Manufacturing Company Marketing Special Ford Lining and Rusco in All Widths.**

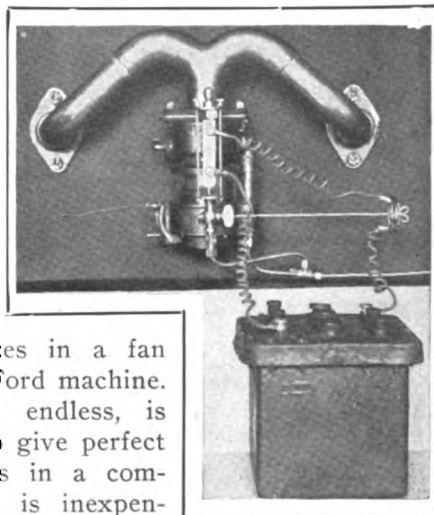
The Russell Manufacturing Company, Middletown, Conn., is marketing the Rusco brake lining and Rusco Ford specialties. The latter is a special material for lining the transmission brake of the model T Ford car, and one of its qualities is that it is woven without wire, which prevents any opportunity of short circuiting the Ford flywheel magneto.

The Rusco Ford lining is woven of a long fibre asbestos, and thoroughly impregnated with a special compound which renders the material water, oil and heat proof. A very high coefficient of friction is claimed for the Rusco brake lining, which is manufactured in widths from one inch to eight and in thicknesses from .125 to .5 inch.

The Ford lining comes in proper lengths to fit the transmission

band, is put up in a neat box, and copper rivets for applying are included in the equipment. The company

also specializes in a fan belt for the Ford machine. It is woven endless, is guaranteed to give perfect service, comes in a compact box and is inexpensive. Descriptive matter will be sent on request.

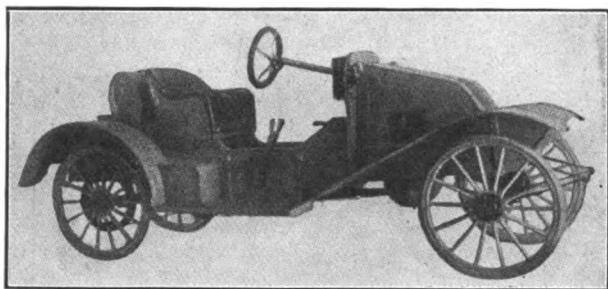


The Duelec Attached to Intake Manifold.

WITH THE CYCLECAR MANUFACTURERS.

Brief Details of Some Early Designs, and Confusion of Types Which Has Resulted in Great Britain---New Models Brought Out Recently in This Country.

IT IS pretty generally conceded in the industry that the first cyclecar was the Bedelia of France, which appeared on the streets of Paris



Latest Model of the Lad's Car, First Marketed in 1912.

in the latter part of 1910. Undoubtedly, others were experimenting along similar lines previous to the success of M. Barbeau, who designed and built this machine. In America the effort would seem to have been along the line of providing a practical machine for the use of children, as exemplified by the miniature National roadster provided for Master Thomas Hoyt of Cleveland O., by the designer of the present day Falcon cyclecar, Francis R. Hoyt.

Hoyt's Miniature Roadster.

This roadster, an illustration of which is presented herewith, first appeared on the streets of Cleveland in 1910, about the same time as the initial announcement of the Bedelia. It was patterned after the famous No. 4, National racer, in which John Aitken was at that time winning contests throughout the country. It was complete in every detail, with the exception that the motor was electric, and it possessed a real clutch, two brakes and a dummy shifting lever. Master Tom demonstrated that it was capable of traveling six miles an hour, and it was in every way a practical machine. There is very little doubt that there were others of a similar character, but this has been selected solely as an example of the forerunner of the American cyclecar.

Some time later the Niagara Motor Car Corporation, Niagara Falls, N. Y., placed the Lad's car on the market. No attempt was made to call this a cyclecar. Rather it was introduced as a practical machine for boys. One of the latest models is shown herewith. The Bedelia was described as a miniature automobile built along the

simplest lines. It will be noted that the Lad's car fulfills this condition.

Bedelia and the Lad's Car.

The Bedelia was fitted with a body, which at the same time served as the frame for the car. The wheelbase was 100 inches and the tread 36. The front axle pivoted at the centre on the spring tube B. The motor, a twin-cylinder motorcycle engine, was fitted in the frame, just back of the front axle. A chain A connected a sprocket on the engine shaft with a sprocket S on the countershaft. There was no clutch. On the ends of the countershaft were pulleys C, taking V motorcycle belts D, which transmitted the power to pulleys P, fastened directly to the rear wheels. The rear suspension was by Lanchester cantilever type springs. The rear axle was fitted to be moved forward and backward by the lever L, providing a variation in speeds by tightening and loosening the belts and doing away with the necessity for a differential. Steel cable, running from the front axle on either side, passed through pulleys and to a drum on the steering post, so that by turning the steering wheel W the cable on either side was pulled. The gasoline tank T was mounted directly over the engine. The weight of the car was less than 400 pounds. The two passengers were arranged tandem, in hammock type seats, the driver at the rear.

Such, in brief, were the mechanical details



Practical Miniature Automobile Produced in Cleveland, O., in 1910.

of the first cyclecar. The Lad's car has a single-cylinder motor of the T head type, with bore of 3.5 inches and stroke of four. Cooling is by

air, ignition by dry cells and the carburetor is a Schebler. The machine is fitted with a cone clutch and the transmission of power is by V belt from the countershaft to the rear wheels. Brakes are of the external contracting type, acting on the countershaft. Full elliptic springs are utilized front and rear. The wheels are 22 inches in diameter, fitted with Goodyear solid tires of one-inch cross section. The wheelbase is 72 inches and the weight, 385 pounds. Provision is made for but one passenger.

Cyclecars Here and Abroad.

The Lad's car was placed in the market late in 1912, but no one seems to have considered it a cyclecar. The name chosen would imply that it was designed as a machine suitable for the use of boys, but there can be no denying that it was an automobile built along the simplest lines. It was not until the middle of 1913 that the American cyclecar, as such, began to attract public attention, and even then the Lad's car appears to have been forgotten by the industry.

Soon after the initial appearance of the Bedelia, Great Britain began to experience wide interest in the new type of automobile. For a time it appeared that greater progress was being made in that country than in any other. Over 100 makers are listed in the United Kingdom, but decided confusion has resulted from the fact that the terms cyclecar and light car were used indiscriminately. And it is worthy of note that a much similar condition has arisen in this country.

In the last issue of *The Automobile Journal* the organization of the Cyclecar Manufacturers' National Association was chronicled, as well as the definitions adopted by that association, by which an attempt was made to classify so-called cyclecars as cyclecars, light cars and small cars. It is somewhat surprising to learn that about the same time the automobile industry in Great Britain took steps to classify the machines of this type made in that country.

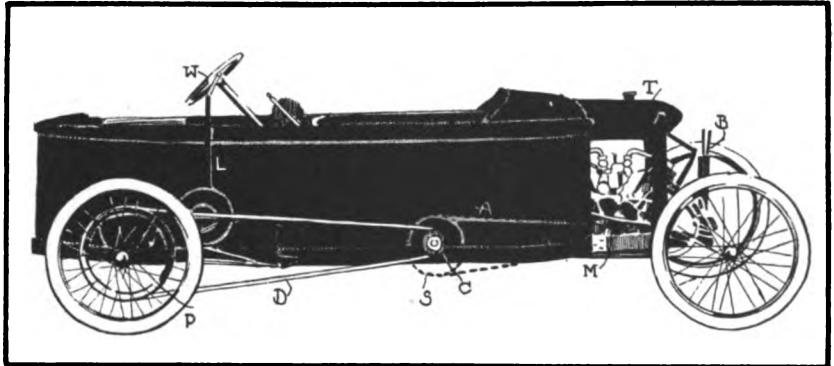
Classifying Various Types.

The American definitions place a car with motor of 70 cubic inches piston displacement and with weight of less than 750 pounds in the cyclecar class. Light cars have piston displacement of 70-100 cubic inches and weight of 750-950 pounds. A small car has piston displacement of 100-125 cubic inches and weight of 950-1150 pounds. It already has been pointed out, in these

columns, that additional confusion may result from the use in this manner of the terms light car and small car.

The British Definitions.

In Great Britain, the only attempt that has been made heretofore to define cyclecars was that of the Auto Cycle Union, which classified them solely for contest purposes as machines having motors of less than 1100 cubic centimeters piston displacement (approximately 66.7 cubic inches) and weighing less than six hundredweight (about 675 pounds). It is now proposed to amend this definition by substituting two: First, that a cyclecar shall be a machine with an engine not exceeding 1000 cc (about 60 cubic inches), and second, that a light car shall be a vehicle with an engine over 1000 cc and not exceeding 1500 cc (about 90 cubic inches). It will be noted that in these proposed classifications weight is not considered. The Autocar, one of the leading motoring prints in England, has



The World's First Cyclecar, the Bedelia, Produced by M. Barbeau of Paris, France, in 1910.

the following to say respecting the matter, editorially:

Motorists are more or less interested in the definition of the light car, for the simple reason that they never quite know what the term light car may mean; and the same remark applies to the term cyclecar. A car of nominally 15 horsepower, and with engine of approximately 3000 cc, may be correctly designated a light car, if it be light for its power and size, but the specialized, though far from general, acceptance of the term is that it describes a car with an engine of not exceeding about half this capacity.

The present confusion has arisen from the absence of a light car definition, and from the rapid development of the so-called cyclecar industry into what is nothing but a miniature or light car. It is true that very many purchasers of light cars or cyclecars do not care whether the machine is designated a cyclecar, a light car or a motor car, as they will call it a motor car whatever the Royal Automobile Club and the Auto Cycle Union may call it. On the other hand, so far as competitions are concerned, the confusion has been very great, and undoubtedly will be greater, unless a couple of practical definitions be established, and, besides, there is the inconvenience of not knowing what is meant by the two terms cyclecar and light car when so many people are using them quite naturally, to mean quite different things.

Many of the so-called cyclecar records on Brooklands have been made by light cars, with specially refined chassis to bring them inside the six hundredweight cyclecar weight limit. There is nothing to be said against

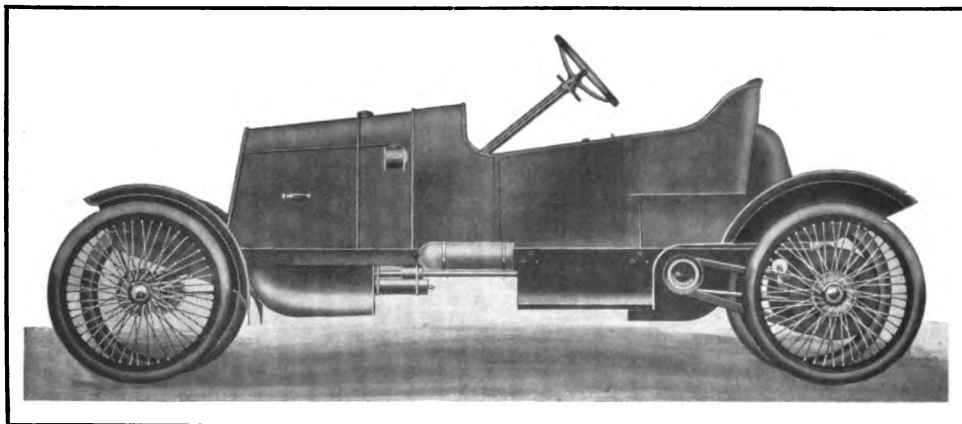
the special record or racing chassis as such; indeed, it is often the means of introducing meritorious modifications in the roadster chassis, but it is very misleading when the cutting of weight brings the racer into another class, as when it makes a cyclecar of a light car.

In making these favorable criticisms of the suggested definitions we should say we have no motives of self-interest to influence us, because we can dispense with the official definitions and use our own at any time if we wish to do so. Nevertheless, we confess we should prefer to see the present confusion of terms ended officially by a couple of common sense definitions, because their absence tends to misunderstanding and to bringing the governing bodies into disrepute.

TWO CHATAUQUA MODELS.

H. J. Newman's Concern Will Produce Passenger and Delivery Car Designs.

A short time ago it was announced that H. J. Newman, who has been connected with the industry for a number of years, had formed the Chautauqua Cyclecar Company at Jamestown, N. Y., on Lake Chautauqua, for the production of a



Chautauqua Passenger Model, with Side-by-Side Seating and Standard Automobile Tread.

cyclecar having wheelbase of 102 inches, standard tread (56 inches) and weight of 600 pounds. The concern is now ready to make detailed announcement of its product, which will be marketed in two models, one for two passengers, seated side by side, and the other for package delivery.

Despite the width of tread—for it is as yet somewhat impossible to disassociate the idea of a narrow tread with that of a cyclecar—this machine is a true cyclecar under the definition of the Cyclecar Manufacturers' National Association. The motor is a twin-cylinder DeLuxe special, air-cooled, with bore of 3.5 inches and stroke of 3.625. Lubrication is by splash, ignition by a Bosch high-tension magneto, and carburetion by a Schebler.

The transmission is by friction discs to the jackshaft, and thence by two V belts to the rear wheels. Although it is possible with a friction

transmission to secure any number of speeds forward or reverse, the design utilized in this machine is arranged to afford three forward speeds and one reverse. Both axles are of the tubular design. The service brake is contracting on the jackshaft, operated by pedal, while the emergency member is expanding on the rear wheels, actuated by a lever in the centre of the car.

The frame is of pressed steel, channel section, 2.5 inches deep, 1.5 inches wide and 12 gauge, well braced by transverse members. The front springs are quarter-elliptic and the rear, semi-elliptic. Wheels are of wire, fitted with 28 by 2.75-inch tires. The above applies to the passenger model, although the delivery wagon chassis is identical, save for the use of 28 by three-inch tires at the rear, and a reinforcement of the rear spring suspension to provide for heavier loads.

The body is of metal, finished in black enamel,

and the seats are roomy, with plenty of leg room—32 inches from dash to heel-board. One extra wire wheel is supplied. The lighting system comprises two electric searchlights, two side lights and a tail lamp. Current is supplied from a six-volt, six-ampere storage battery located under the seat. The maker claims that the

car is capable of a speed of about 40 miles an hour and a gasoline consumption of about 40 miles to the gallon.

WHO CONTROLS CONTESTS?

American Cyclecar Association Formed by Representatives of Local Clubs.

It appears that while the cyclecar manufacturers were busy forming their association at Chicago during the recent automobile show, representatives from the various local cyclecar clubs in Chicago, New York, Indianapolis, Detroit, Cleveland and other cities were organizing the American Cyclecar Association. Among other things, it is understood that this new body expected to take over the control of contest events for the new type of machine. However, the Cyclecar Manufacturers' National Association,

meeting for a second time shortly after the organization of the American Cyclecar Association, voted to co-operate in every way with the American Automobile Association. Since the American Automobile Association considers the cyclecar a motor car and has already granted sanctions for cyclecar contests, there appears to be some confusion on this score.

ANNOUNCES EUCLID MODEL.

Well Known Men Form Company for Its Production in New Haven, Conn.

Among the latest announcements in the cyclecar field is the Euclid, which will be produced by the Euclid Motor Car Company, with factory in New Haven, Conn., and general offices at 80 Broad street, New York City. The company is composed of a number of men well known in the industry, including E. S. Cameron, designer, who first began manufacturing automobiles in 1900; E. A. Scheu, general manager, who formerly was identified with the Packard Motor Car Company and was more recently general manager of the Invader Oil Company, and Frank S. Corlew, sales manager, who was until recently sales manager of Cameron Manufacturing Company.

The Euclid is officially described as a cycle-light car, being equipped with a four-cylinder motor of three-inch bore and 3.5-stroke. The wheelbase is 100 inches and the tread 40. The two passengers are seated side by side. The weight is about 775 pounds.

The motor is a C-S-C, air-cooled unit, made by the C-S-C Engine Company, and, like the car, is designed by Mr. Cameron. Ignition is by high-tension magneto, and lubrication by plunger pump. Power is transmitted through a sliding gearset of the progressive type, affording three forward speeds and reverse. The clutch is a cone. Final drive is by straight shaft with a single universal joint.

The front axle is a seamless, drawn steel tube, with drop forged ends. The rear axle is semi-floating. The service brake is external contracting, and the emergency, internal expanding, both acting on the rear wheel hubs. All springs are of the cantilever type, special design. The driver is placed at the left. The wheels are of wire,

fitted with 28 by three-inch tires all around.

It is understood that Mr. Corlew plans to leave New Haven, March 6, on a trip over the road to the Boston show, in one of these vehicles.

GENERAL CYCLECAR NEWS.

Brief Details Concerning Other New Models Announced Recently.

From New Orleans, La., comes the announcement of the Mino, made by the Mino Cyclecar Company of that city. Complete details are not yet ready for publication, but the designs call for a two-cylinder, air-cooled, V type motor rated at 9-15 horsepower. The gearset is a two-speed planetary type, and final drive is by V belts. The



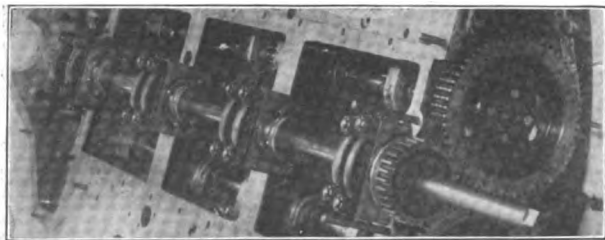
Designer E. S. Cameron and Frank S. Corlew in Euclid Cycle-Light Car.

wheelbase is 96 inches and tread 36. The tires are 32 by three. This machine is to be equipped with an electric lighting and starting system.

Two more machines are announced from Chicago, these being the Standard made by the Standard Engineering Company, and the Steco, made by the Stephens Company. The former has wheelbase of 100 inches and tread of 42, and seats side by side. It utilizes a DeLuxe motor, friction transmission, single chain drive, wire wheels and 28 by 2.75-inch tires. The Steco is presented in three models, each of 100-inch wheelbase. One of these seats two passengers tandem, the second seats three and the third is a delivery wagon type. The motor is a two-cylinder, air-cooled unit with 70 cubic inches piston displacement. Power is transmitted by friction discs and V belts. The wire wheels have 28 by 2.75-inch tires.

DETAILS OF MARTELL ALIGNING REAMER.

A TOOL that was originally designed for the reaming of automobile crankshaft bearings, the idea being to provide the repair man



Martell Device Shown Aligned to Ream Crankshaft of Packard Motor.

with a means of accurately aligning these bearings and saving time in the operation, is the Martell aligning reamer, recently placed on the market by the Martell Motor Company, 1928 Columbus avenue, Boston, Mass. The simplicity of the device has suggested possibilities along other lines, but its practicability has been demonstrated in the service above mentioned, in that it is stated that it has been found that better results can be accomplished with three or four hours' work than with the same number of days by the old hand method.

The parts of the device are shown herewith. A is an eccentric, flanged bushing that, in use, is mounted directly on a shaft. U is a short shaft used in reaming connecting rods, but the longer shaft for reaming crankshaft bearings is similar in every respect, except for length. The flanged portion of this bushing is provided with a radial slot, concentric to the surface engaging with the bore of B, which is another eccentric, flanged bushing in the bore of which A is an easy wiring fit. The flanged portion of B is provided with six tapped holes, concentric with the bore, and a cap screw B₁, passing through the radial slot in A serves to lock the two bushings together in any desired position. The edges or faces of the flanges are graduated, A having 19 divisions and B 20, which give a vernier reading in thousandths of an inch, the extreme limits being 0 and .095.

C is a conical bushing, the tapered portion of which is provided with a fine thread, 70 to the inch, which permits it to be screwed very firmly into the ends of the bearings or holes to be

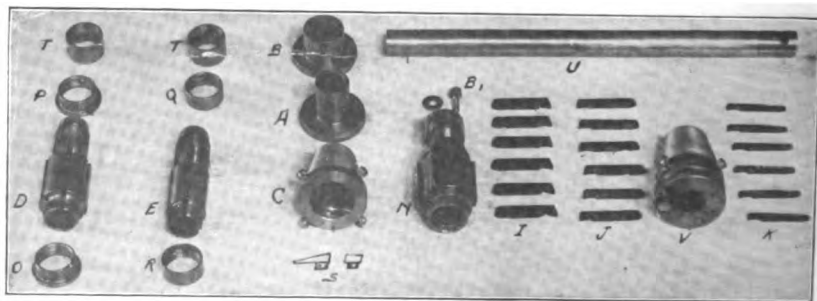
reamed. The bore of this bushing is ground to take the bushing B, and it is provided with four clamping screws to lock the position of B when the desired point is determined. The adjustable plug is shown assembled at V.

The reamer consists of two heads, D and E, carrying six blades in the slots, as shown in the assembly N. At either end of each of these slots are wedges S (enlarged) which engage the inclined surfaces of the blades I, J, K, and cause them to expand or contract as the adjusting nuts O, P, Q and R are moved in one direction or the other. T T are clamping nuts that hold the reamer head in any desired location on the shaft.

The other illustration presents the device aligned to ream the crankshaft of a Packard six-cylinder motor. This view shows the crankshaft gear mounted directly on the reamer shaft by means of a special bushing and the proper mesh of the gears is obtained by means of the eccentric bushings. The rear end of the shaft is then aligned to the clutch shaft bearing support at the extreme rear, and also aligned parallel to the top of the crankcase.

The blades of the reamer are made of non-shrinking steel, oil tempered, ground and provided with a six-degree cutting edge on the front end only. In order to ream clear through the bearing, the bushing at the back must be removed, when the reamer acts as its own guide for the short distance remaining to be reamed. The bushing is then returned to its former position.

When the reamer shaft is first lined up a positive turning movement is determined. Thus, if it be found that three ounces weight on a four-inch leverage will move the shaft, then, when the bushings are returned to their original positions,



Individual Components and Assemblies of Parts of Martell Aligning Reamer, Lettered for Convenience in Describing.

the same weight and leverage must produce the same result. In practise, however, it is said to be found necessary to use the weight but seldom.

The features of the device are held by the maker to be:

First, the supporting of the reamer shaft by a number of temporary bearings.

Second, the fact that these temporary bearings engage directly with the hole to be reamed, thus making the device entirely independent of any type or form of construction of the supporting members of holes to be reamed. The fact that the crankcase is not bolted down to a rigid base is an added assurance of perfection of alignment.

Third, the facility of adjustment of the position of the reamer shaft in relation to any point or points, as for instance, paralleling some given surface or obtaining the

correct mesh of a train of gears, one member of which is to be carried on the shaft for which the bearings are being reamed.

Fourth, the securing of a great range of adjustment of the reamer blades with a relatively small lateral movement of the adjustment nuts.

Fifth, the means of securing the reamer heads to the shaft in such a manner as to allow them to be solidly clamped in any desired position.

It is understood that the Martell reamer is to be demonstrated at the Boston show. The maker will supply full detailed information to those who are interested and make request.

GOODYEAR PRODUCING NEW RIM TYPES.

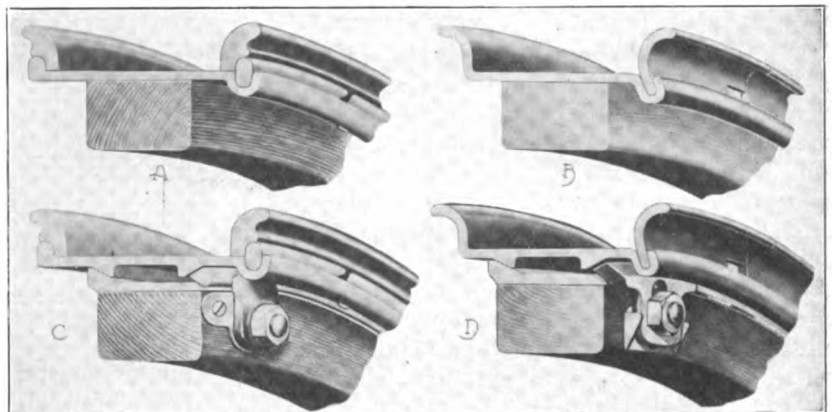
ANNOUNCEMENT is made by the Goodyear Tire & Rubber Company, Akron, O., of two new types of rims which are the result of more than a year of testing and experimentation to obtain an especially light, strong, effective quick detachable or demountable rim for No-Rim-Cut tires and all standard types other than clincher.

The new rim is made in the old Goodyear '07 profile, permitting the tires to widen out at the base and rest in their natural positions, the company pointing out that this construction provides greater air space and capacity, and makes for increased mileage. It is also held that the side walls are subjected to less stresses, as the beads are not pinched. In the new design the flanges are made high, and have the proper contour to give the necessary support to a No-Rim-Cut or straight side tire. Four styles are offered, these being shown in an accompanying illustration. The No-Rim-Cut detachable is a simple design, very light, averaging 10 pounds lighter than other types, effecting an economy of 40 pounds to the set. It will be noted that the base and inner flange have been combined in a single section with a groove in which the detachable flange is locked, while the separate locking ring has been eliminated, the outside flange being sprung into the groove in the same manner as the locking ring. It is supplied also in the demountable form.

In the demountable form the rim itself has the usual double-bevel seat, the inner side of which matches a corresponding bevel seat on the inside of the felloe band, while the outer bevel is supported by specially formed lugs, which are offset at an angle to correspond with a chamfer

on the outer edge of the band. Tightening a nut on the lug bolt serves to force the lug inward and upward over the chamfer, thus wedging and locking the rim into place.

The Ideal detachable is identical with the Goodyear '07 rim. Its side rings are supplied either for clincher or No-Rim-Cut tires as desired. It is heavier than the two-piece rim and is suitable for heavy cars. The rim is also supplied with demountable attachment when desired, attachment being made by means of a removable wedge ring fitting between the rim and



New Types of Goodyear Rims: A, Ideal Detachable; B, No-Rim-Cut Detachable; C, Ideal Detachable Demountable; D, No-Rim-Cut Detachable Demountable.

felloe band, and a set of lugs which serve to draw the wedge ring into place, thus providing the proper seating for the rim. All Goodyear rims fit standard Firestone and Kelsey felloe bands.

At the recent show of the Wisconsin Hardware Retail Association in Milwaukee, Wis., the Lippow Motorcycle Company exhibited a full line of Flying Merkel motorcycles, made by the Miami Cycle & Manufacturing Company, Middletown, O. Mr. Lippow, head of this concern, was assisted by William McKinley Sheets, central district manager for the Miami company.

ADVANTAGES OF POWER DRIVEN TIRE PUMPS.

Can Inflate Large Tires in One to Three Minutes, Economizing Time and Insuring Proper Pressure---Variety of Highly Perfected Designs Offered for 1914.



THE number of concerns engaged in the manufacture of power driven tire pumps has increased steadily during the past 12 months and, with those who have marketed designs for several years,

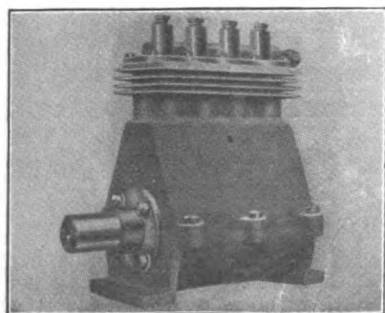
now form a branch of the au-

tomobile industry which is attracting attention both from the car designer and the owner.

The growing popularity of this equipment has been so simplified that it is possible to inflate designs. The present models are not only light in weight and very compact, but their operation has been so simplified that it is possible to inflate a large tire on the road in from one to three minutes, the time consumed depending upon type of pump. When it is considered that the operation involves no other labor than that of connecting the hose to the tire valve and moving a lever, the attitude of the public is readily understood.

Has Many Advantages.

The advantages are numerous when contrasted with the manually operated pump. It relieves the owner of arduous labor, is a great time saver, and, being fitted to the car, eliminates the possibility of being left in the garage or borrowed, as often is the case with the hand pump. More important than any of these is the matter of tire economy. It is a well known fact that the average motorist is prone to under-inflate his tires, and this is especially true when making a change on the road in hot weather. Frequently a lack of time is responsible for the improper inflation. By use of the power driven tire pump, with a safety valve, and a pressure gauge incorporated in the line, evils of guess work are eliminated.



Bastain Four-Cylinder Design.

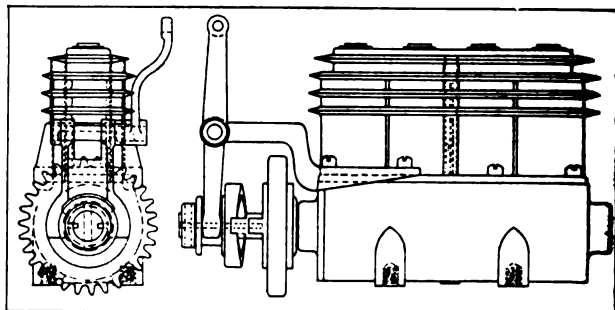
That consideration is being given by the car designer to the fitting of the pump is noted in several 1914 models, and some makers who have not adopted the machine as stand-

ard equipment have made provision for its installation. Several instances are noted where the pump occupies a prominent position along with the dynamo and water pump, being driven from the same shaft.

Practical for Used Cars.

Many motorists desiring to equip their machines in this manner, have, in the past, decided that the work would involve a considerable expenditure and possible alterations to the power plant. Today it is possible for the owner of the used car to obtain all essential fittings, etc., and to install the pump at a moderate cost; in fact, several makers specialize in brackets, gears, pulleys, etc., for standard models.

Relative to the installation of the pump on the motor: It is generally a simple matter to attach a bracket for mounting the pump, and to take a drive from the shaft actuating the water

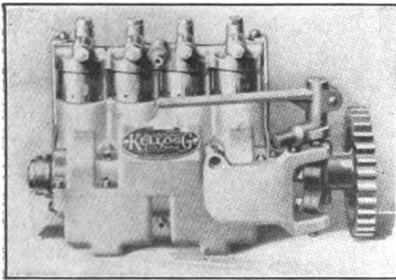


Assembly of No. 20 Four-Cylinder Universal Pump, Showing Clutch Mechanism.

pump and magneto, fitting a split gear to the shaft between these members. When this does not make for convenience a silent chain drive may be employed, or a gear fitted to universal joint housing, gearbox, etc. The majority of the manufacturers are prepared to submit drawings, indicating attachment, and specializing, as they do, apparent obstacles are easily overcome.

Highly Perfected Designs.

The modern types of power driven tire pumps are highly perfected little machines, and in the majority of instances are built along the lines of the automobile engines, having forged crankshafts, or eccentric shafts, pistons, and in many instances the connecting rods, patterned after those of the gasoline motor. The workmanship and material are first class in every respect, and the parts so assembled as to exclude foreign ele-



Kellogg with Gear Shifter.

the fours are cast en bloc, and in some cases it is noted that the upper half of the crankcase and cylinders are cast integral. The majority of the makers divide the crankcase much in the same manner as with the gasoline engine, utilizing the

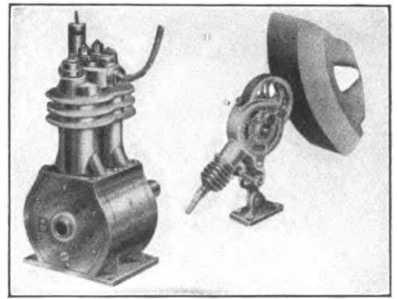
ments and to be fool proof.

The designs include one, two, three and four-cylinder models, and in the casting of the cylinders motor car practise is followed; that is,

gines, are utilized, and it is stated that under the severest service the pumps do not overheat.

Cast iron is generally employed for cylinder material, with piston and rings of the

same metal, and the same care is taken in grinding and fitting as with the gasoline engine, as it is important, inasmuch as the compression is an



Hers Types—At Left, Two-Cylinder Design; at Right, Friction Driven.

SPECIFICATIONS OF 1914 POWER DRIVEN TIRE PUMPS.

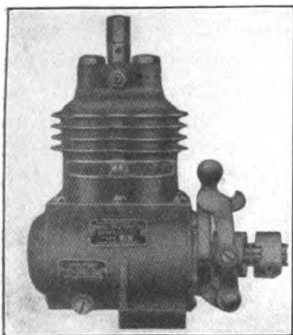
Name	No. Cyl.	Bore	Stroke	Length	Width	Height	Weight	Manufacturer.
ABELL	3	1 7-16	1½	9¾	4	4	6	Standard Thermometer Co., Boston.
RASTIAN	4	1	1¾	6¼	4¾	7¾	..	General Utility Co., Philadelphia.
BROWN	4	1½	...	...	...	...	10	Brown Company, Syracuse, N. Y.
COLSTAD	1	¾	1¼	...	...	...	..	Colstad Mech. Lab. Co., Atlantic, Mass.
HANNA	2	1½	1½	5¼	4¾	7¾	6½	Troy Auto Specialties Co., Troy, N. Y.
HANNA	2	1½	2	6	5	8½	9½	Troy Auto Specialties Co., Troy, N. Y.
HERZ	1	1¾	2½	...	...	...	11	Herz & Company, New York City.
HERZ	2	1¾	2½	7	3½	11	7	Herz & Company, New York City.
KINGSTON	2	1¼	2½	...	...	...	..	Kokomo Electric Co., Kokomo, Ind.
KELLOGG	4	1½	1	7¾	3½	6¾	10	Kellogg Mfg. Co., Rochester, N. Y.
LIPMAN	4	1¼	1¼	7¾	3½	6¾	10	Lipman Mfg. Company, Beloit, Wis.
MASTER	1	1½	1¼	...	...	...	7	Hartford Mch. Screw Co., Hartford.
MASTER	2	1¾	1¼	7 3-16	5	8 7-16	10¾	Hartford Mch. Screw Co., Hartford.
MANZEL	2	1¾	1½	6¾	4¾	8	6	Manzel Bros. Co., Buffalo, N. Y.
MANZEL	2	1¾	1¾	7¾	3½	8	..	Manzel Bros. Co., Buffalo, N. Y.
NOIL	...	...	...	6	3	7¾	7	Taylor Manufacturing Co., Chicago.
O. B.	2	1½	1¼	4 9-16	2¾	6¾	7	Universal Mfg. Co., Minneapolis, Minn.
O. B.	4	1½	1¼	7¾	2¾	6¾	..	Universal Mfg. Co., Minneapolis, Minn.
PEERLESS	1	...	...	...	...	...	..	Peerless Accessories Mfrs., Chicago.
PEERLESS	4	...	...	8¾	3¾	6½	..	Peerless Accessories Mfrs., Chicago.
STEWART	1	1 7-16	2½	...	...	...	..	Stewart-Warner Speed Corp., Chicago.
STEWART	4	1 7-16	1¾	10	4	8	..	Stewart-Warner Speed Corp., Chicago.
TRI-PHOON	3	...	...	6	4	4	..	Green & Swett Company, Boston.
TEN EYCK	1	2¼	1¾	5	4½	9½	9	Ten Eyck Pump Co., Auburn, N. Y.
TEN EYCK	3	2¼	1¾	10	4½	9½	18	Ten Eyck Pump Co., Auburn, N. Y.

lower half for the oil reservoir, as splash lubrication is favored. In all models, precautions are taken to prevent the possibility of any oil being conveyed to the tire. While the vertical type predominates, there are some makes with horizontal cylinders; in fact, several machines are offered which are interesting because of the originality of their design.

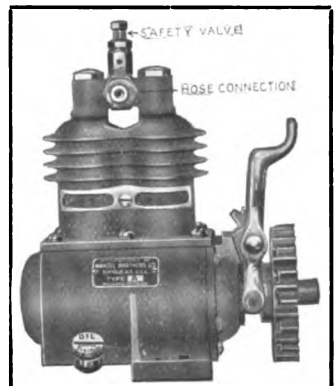
Unlike the gasoline motor, the power driven tire pump is air-cooled, there apparently being no necessity of cooling by fluid. Flanges, very similar to fins utilized on the air-cooled types of internal combustion en-

important factor in the efficiency of the pump. Some makers incorporate eccentrics for the reciprocation of the pistons, while others make use of miniature crankshafts with the conventional design of crank throws. Not all are of the above named design, as one maker has attained success with a leather plunger piston, a type that is fitted to several 1914 models.

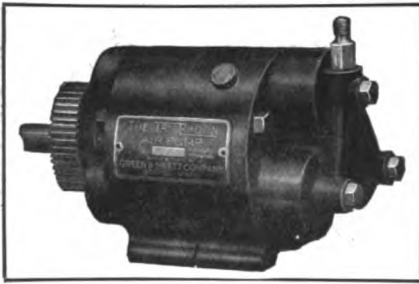
The speeds at which the pumps are driven vary. One maker states that his product will inflate a 36 by 4.5-inch tire to



Manzel with Clutch Shifter.



Manzel with Gear Shifter.



Tri-Phoon, a Three-Cylinder Type.

same manufacturer markets another model which at 700 revolutions a minute is said to be capable of inflating the same sized shoe in one minute and 30 seconds. Single-cylinder pumps may be obtained which will inflate a large shoe in from 2.5 to five minutes. There are several designs which are capable of inflating the largest shoe in three minutes, considerably less time than is required to remove the hand pump from the tool box or the tonneau.

In an accompanying table are given the dimensions of the leading manufacturers of power driven tire pumps, and the figures include the overall height, width, length, etc.

Tri-Phoon.

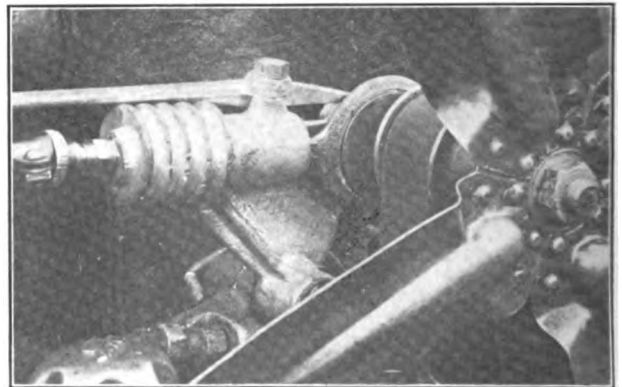
One of the most recent additions to the ranks of pump manufacturers is the Green & Swett Company, 737 Boylston street, Boston, which is marketing the Tri-Phoon, a three-cylinder design with several novel features. One of its qualities is that it is particularly adapted to used automobiles, the company specializing in brackets, fittings, etc., for standard makes of cars. The pump contains three reciprocating pistons driven by a rotary cam, the pistons being controlled on the cam surface by means of roller bearings, constructed of the best grade of steel, hardened and ground. Specially constructed metal piston rings are utilized. Simplicity, durability and efficiency are features of the design emphasized,

which is guaranteed and moderately priced. The maker states that at 800 revolutions a minute it will deliver a steady flow of pure, fresh air, equal to the pressure drawn from an air tank charged 115 pounds to the square inch. The

Tri-Phoon may be installed by means of a bracket and driven from the crankshaft, or the magneto, pump or camshaft. The pump proper is placed in service by means of a unique shifting lever or clutch. It comes complete with hose, gauge, etc.

Stewart-Warner.

The Stewart, made by the Stewart-Warner Speedometer Corporation, Chicago, is made in two models, a single-cylinder and a four. The design is similar to that of an automobile engine, with drop forged steel crankshaft, bearings, connecting rods, pistons, etc. The crankcase is divided and lubrication is by a non-fluid system. The connecting rods are driven by means of eccentrics working within the lower ring on the rod. The intake is valveless, air being admitted through apertures in the cylinder walls just below the piston head when the piston is in its lowest position. All working parts are fully protected from foreign elements. The single-cyl-

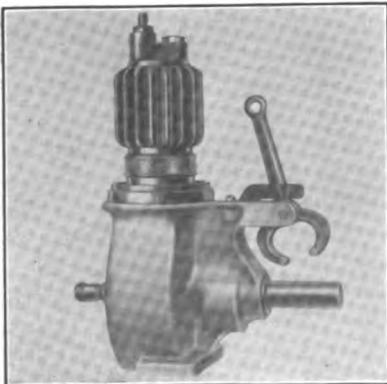


Colstad, Single-Cylinder, Designed Especially for Ford.

der design is constructed of the same high grade material, and both are noticeable for their compactness, light weight and efficiency. A clutch is employed.

Kellogg.

Kellogg pumps, made by the Kellogg Manufacturing Company, Rochester, N. Y., are four-cylinder units, and are made in air and water-cooled forms. The latter is more generally employed with motor starting systems. Each cylinder is provided with a double check valve. The pistons are actuated by eccentric cams placed on the shaft at angles of 90 degrees, a construction which the maker states insures a steady flow of air. The pistons are of a special anti-friction metal, made leak proof by a cup packing construction, and lubrication is by a splash system. Maximum efficiency is stated to be at 600 revolutions a minute, when it will inflate a 34 by four-inch tire to 75 pounds in less than two minutes.

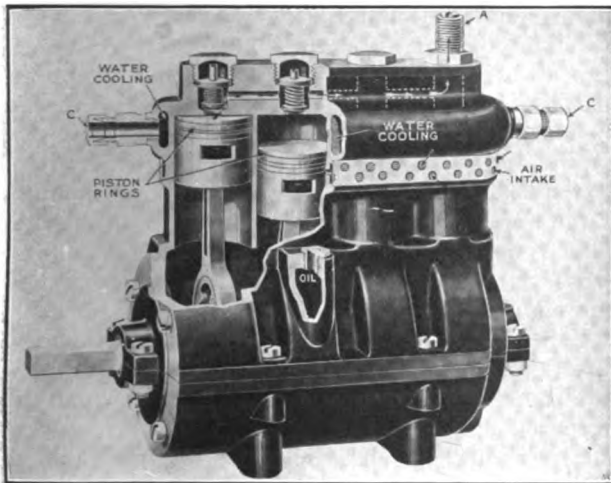


Stewart Single-Cylinder with Shifter.

Drive is possible in a number of different locations. Connection with the driving member is by a clutch or gear.

Manzel.

The Manzel, made by the Manzel Bros. Company, Buffalo, N. Y., is a two-cylinder type and is constructed in several forms, these including a gearshifter style, plain and clutch. It is built along the lines of a gasoline engine and each piston is provided with two rings. All air is screened, and free from lubricant. Lubrication is by splash. Each model is equipped with a safety valve to prevent over-inflation, and it may be set at any desired pressure. This obviates the necessity of watching a gauge. At 600 revolutions a minute the Manzel will inflate a 36 by 4.5-inch shoe to 90 pounds pressure. In addition to the usual hose, etc., a coil is provided for cooling the air before it enters the tire. High



Stewart Four-Cylinder Design, Showing Construction Along the Lines of the Gasoline Engine.

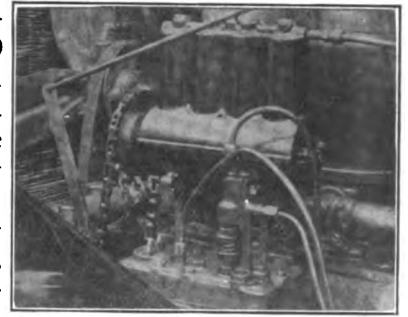
grade material and workmanship are noticeable features of the designs.

The Colstad, produced by the Colstad Mechanical Laboratories, Atlantic, Mass., for which the Motor Supply Shop, 925 Boylston street, Boston, is distributor, is designed for the model T Ford car, and goes on the front end of the motor in place of the fan bracket. The pump is placed in action by moving a lever toward the dash, which meshes an eccentric with the fan pulley. It is stated that it is easily attached, will inflate a tire in three minutes, and is moderately priced.

Herz in Two Forms.

Herz & Co., 245 West 55th street, New York City, is marketing two types of pumps, one a friction driven and the other the B. B., a two-cylinder unit. The latter is very efficient and de-

velops a pressure of 250 pounds. Each cylinder has a separate intake and delivery valve contained within a housing which screws into the cylinder head. A safety valve is placed back of and between the exhaust valves, making it impossible to pump up more than a predetermined pressure. The B. B. is furnished with a clutch and so installed that it can be operated from the dash.



Peerless Driven by Chain.

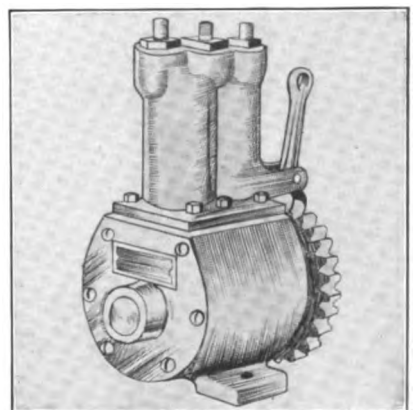
Two models are produced by the Peerless Accessories Manufacturers, 1926 South Wabash avenue, Chicago—a four-cylinder and a special design for Ford cars. The latter is a single-cylinder unit driven from the engine shaft by an eccentric rod. The pump is placed in service by a rod outside the radiator. The stud holding the pump to the car frame is hollow and has a connection for the tubing carrying the air to the tire. The pump may be operated without stopping the motor or lifting the hood.

Designed for Ford.

The four-cylinder unit is practically the same as a gasoline engine, is mounted on a steel bracket, and is driven by silent chain. Ordinarily a sprocket on the magneto shaft is arranged to be engaged by a jaw clutch from the seat. The air is piped to a gauge on the dash, which has a connection for the tubing carrying the air to the tire.

The Universal Manufacturing Company, Minneapolis, Minn., is marketing a line of two and four-cylinder pumps, in which compactness and efficiency are emphasized. They are guaranteed to produce 300

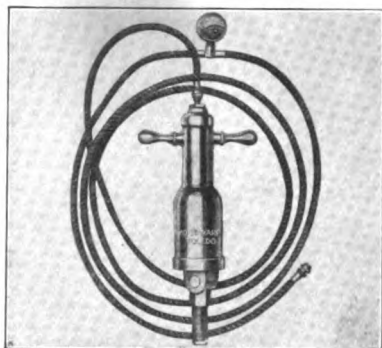
pounds pressure. One of the several methods of installation provides for a gear drive and control from the driver's seat. Among other makers of high grade pumps is the General Utility Co., Philadelphia.



Master Two-Cylinder with Shifter.

SPARK PLUG POWER TIRE PUMPS.

SPARK plug tire pumps are not only moderately priced, but their use does not involve any other labor than that of fitting to the spark

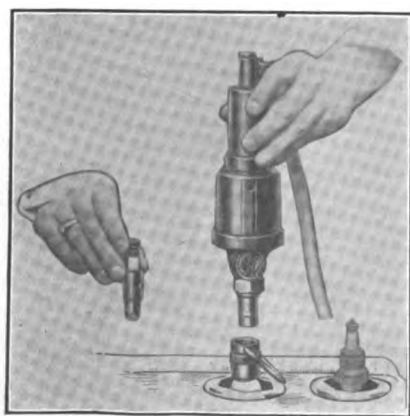


Woodward Impulse Pump.

plug opening in the cylinder. Several makers provide quick detachable means whereby the spark plug core may be displaced by the fingers and the pump inserted and locked into position by a slight movement. Spark plug types of tire pumps are operated by the compression of the motor, and being very compact may be stored easily in the tool box. In all designs provision is made to prevent any lubricant being carried to the tire.

The Brown Impulse, manufactured by the Brown Company, Syracuse, N. Y., is of the quick detachable type, although early types were constructed to be screwed into the spark plug opening. Owners of these models may obtain the quick detachable connections at a moderate cost. The Brown is made like a motor, with two cast iron pistons and rings, and a connecting rod of high grade steel between the larger piston, on which the compression acts, and the smaller one which forces the air to the tire. The Brown is quickly placed in service and comes with ample length of tubing, gauge and connections.

The National Telescope pump, made by the National Motor Supply Company, Cleveland, O.,



Mayo Quick Detachable.

is a new design utilizing a floating piston having a tube attached to its upper side. As the piston in the engine cylinder moves up and down the compression and suction move the piston in the pump in a

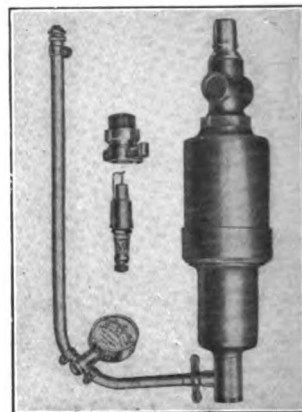
like manner, causing the brass tube or piston stem to slide in and out at the top of the pump. The pump is but five inches high and the maker states it is very efficient, utilizing 100 per cent. of the area inside it. A feature is a neat wooden handle for tightening or loosening the pump in the cylinder. The usual tubing, gauge, etc., are supplied.

The maker of the Woodward Impulse pump, Woodward & Son, Toledo, O., claims a distinctive principle of operation.

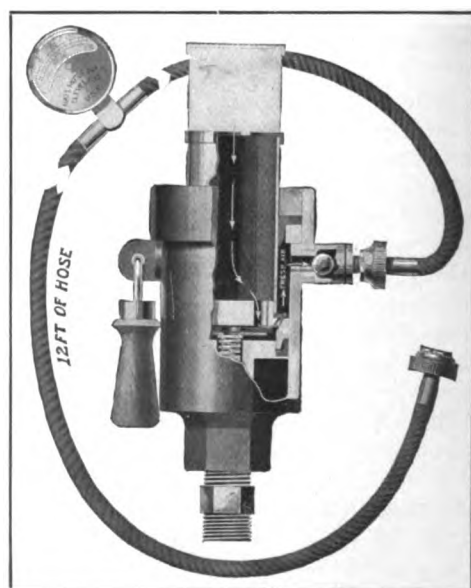
It is termed a high momentive compound pump in that the power that operates it is due to the means by which the pressure is built up by the engine and released at a preconceived time. It is stated that a pressure of from 250 to 300 pounds is obtained with a 35-pound compression engine. The Woodward is guaranteed to 200 pounds pressure. It is equipped with insulated handles and comes with hose, gauge, etc.

The Mayo, made by the Mayo Manufacturing Company, Chicago, is now being marketed with quick detachable means, and the company is prepared to supply owners of former types with the new plug, which is made to fit early models.

Spark plug types of pumps are also made by the Garage Equipment Company, Milwaukee, Wis.; the Hill Pump Valve Company, Chicago; the Marvel Mfg. Co.



Brown Impulse Pump.



New Type of National Telescope Pump.

DASH PRIMER FOR MODEL T FORD MOTOR.

DESPITE the large number of moderately priced devices for assisting to start a cold motor, many owners display considerable ingenuity in fitting home made attachments. An instance of a practical installation was noted recently by the writer, and the owner stated that although the machine was stored in an unheated garage, it was an easy matter to start the motor in the coldest weather.

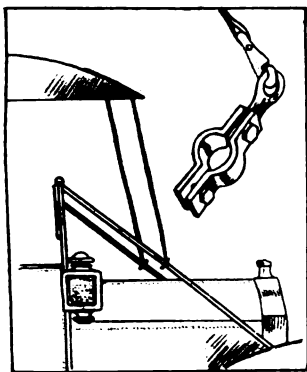


Fig. 1—Method of Shortening Top Straps.

The equipment is shown at Fig. 2, and comprises a dash priming cup, tubing connecting it with the intake manifold, and a spraying device, which is shown separate in the drawing. It will be noted that the last named member is perforated. The inventor attributes the success of the primer to these holes.

To utilize the primer a little gasoline is poured into the cup on the dash and the lever turned slightly to admit the fluid, also a little air. The fuel flows through the tube to the perforated member, and upon cranking the engine, the air drawn in through the carburetor and petcock breaks up the fuel, converting it into a rich mixture. It is stated that the motor will start on the second or third crank even in the coldest weather.

The material required to install the primer consists of a petcock, which is secured to a plate on the dash; a connector having a tubing and a pipe thread end, .125-inch annealed copper tubing, and a union. To the last named is soldered a piece of brass tubing which is drilled full of No. 62 drill holes. Its length should be approximately that of the diameter of the intake pipe into which it is inserted by drilling and tapping a hole. The manner of installing the parts is clearly depicted in the drawing. It is stated that the equipment described can be made at a slight cost.

The owner of the machine, which is a model T Ford, states that he has obtained increased mileage by the use of the primer, as the petcock on the dash may be opened to admit auxiliary air. In average running in warm weather he has secured 26.5 miles to the gallon, and 32 in

long trips. The car is utilized in business and in one season covered 13,000 miles.

FORD TOP HOLDER.

With the early model T Ford cars the top when up is held by straps running from the front to eyes on either side of the radiator. When lifting the hood, for example, the straps are in the way and to change their position, as well as to make for convenience when raising the top, the plan shown at Fig. 1 was devised by a reader.

With this model car the windshield is supported by rods extending from it to the forward end of the frame. Two clamps were made as shown in the smaller sketch, these being constructed of heavy brass and drilled to take a machine screw and locking nut. The eye for the top hook was inserted as illustrated and the clamps secured to the windshield rods so that when the top was raised and the straps were in position, the last named were in a vertical position. In the drawing they are shown at a slight angle to depict the method of attachment. The plan involves the shortening of the straps, which may be done at a slight expense, and the clamps can be made from the scrap heap.

LOCKING GREASE CUPS.

Grease cups, especially those in which a light lubricant is used, are sometimes lost through vibration. If it be found that the cup rotates too easily, or has a tendency to work loose, the fault may be corrected by compressing slightly the cup proper. A light tap with a small hammer will suffice. This will cause the cup to bind a little.

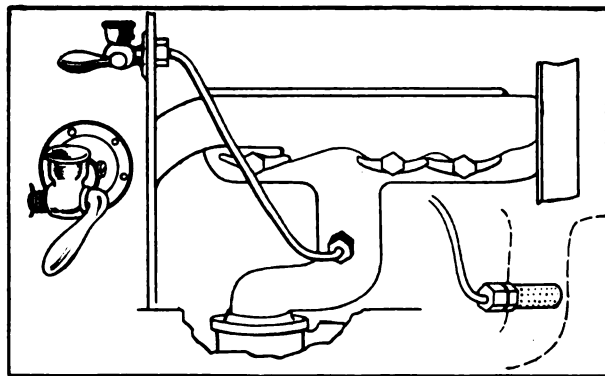


Fig. 2—Dash Priming Device for Ford Motor—The Fuel Is Broken Up by the Use of Perforated Tube Within the Intake Manifold.

FOX AUTOMATIC SWIVELLING HEADLIGHTS.

THERE were and are today motorists who favor the single dash swivelling headlight because its rays may be deflected to light up curves

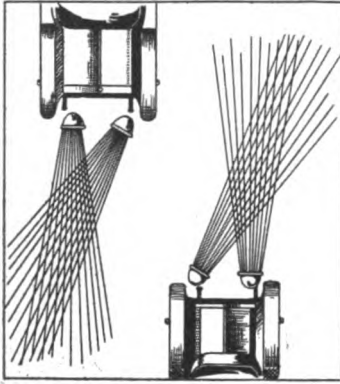


Fig 1—Showing Anti-Dazzling Feature of Fox Lamps.

and to read sign boards. It has its disadvantages, however, in that to pick up and follow a curve, one hand must be taken from the steering wheel and the light skillfully operated. A design which provides automatic control of the headlights, permits of independent action of either, and does

not require new lamps or alteration of the regular members, is that of the Fox automatic swivelling headlights, manufactured by the Fox Auto Searchlight Company, 78 Fountain street, Providence, R. I.

The control of the headlights is such that when turning in either direction the lamps are turned in the same direction as the wheels, the turning movement of the lamps being at first much quicker than the wheels, decreasing gradually until the extreme position is reached. The rays of the inner lamp at direct ahead cover about 45 degrees of a circle, and these rays are swung about 45 degrees, so that they cover from a point at a right angle to the path of the car, while the rays from the outer lamp cover the path from a point directly ahead to the rays of the inner lamp, the two covering approximately a full quarter circle, so that all of the area from a point at a right angle to the path of the car to the point directly ahead of the outer lamp is illuminated.

When the car wheels are first moved by turning the steering wheel, the movement of the lamps is very rapid, the rays showing everything long before the car reaches it. The position of the lamps is not often the extreme, but the position covering the arc in which the car is turning is reached almost instantly, and when the wheels are set for a given position, either directly ahead or making a turn, the position of the lamps remains turned until the wheels are again moved.

The lamps illuminate curves and corners automatically, and in addition may be instantly controlled from the driver's seat independent of the steering gear, so as to throw the light across

curves or corners before reaching them, or if desired, to illuminate in this manner ruts, ditches, washouts or other obstructions by the side of the road. Another advantage is that the Fox light may be utilized to read sign boards, street names and house numbers. This feature will appeal to those who tour, etc.

One of the qualities of the construction is the elimination of the glaring effects. It is well known that it is the left hand lamp of the approaching car that is blinding. With the Fox design this lamp is deflected as shown at Fig. 1, lighting up the side of the road, while the other light projects its rays ahead. In traversing a road where one side is being torn up for repairs, etc., the outer lamp may be deflected to illuminate the obstructions and the rays of the other utilized directly ahead.

The equipment may be attached to any car, and one of its features is that the lamps are always automatically aligned. Lost motion of the steering gear does not affect their operation, as they are not actuated by the steering linkage, being independent of it. Adjustment is also provided, and the maker states that there is no wear of the parts.

The design is the invention of Joseph P. Fox, a pioneer in automobile construction, having had 15 years experience in France and Germany. For several years he was associated in experimental work with the late Otto Reimann, head of the well known German lamp firm of Reimann in Saxony.

John W. Coggshall of Rhode Island, well known in textile and financial circles, is president and treasurer of the Fox Auto Searchlight Com-



Fig. 2—Illustrating How Fox Automatic Searchlights Fully Illuminate Road and Curve—With Fixed Lamps the Inner Section Is Unlighted.

pany, George P. Patterson, connected with several business enterprises, general manager, and Mr. Fox, consulting engineer.

BOSCH ANNOUNCES LIGHTING SYSTEM.

AFTER considerable experimentation and tests the Bosch Magneto Company, New York City, is placing upon the market its electric lighting system for motor cars. Announcement was delayed until the engineers of the company were satisfied that the Bosch method of controlling the output of the dynamo was such as to prevent overcharging of the cells, and that the generator could be utilized to supply the current direct to the lamps.

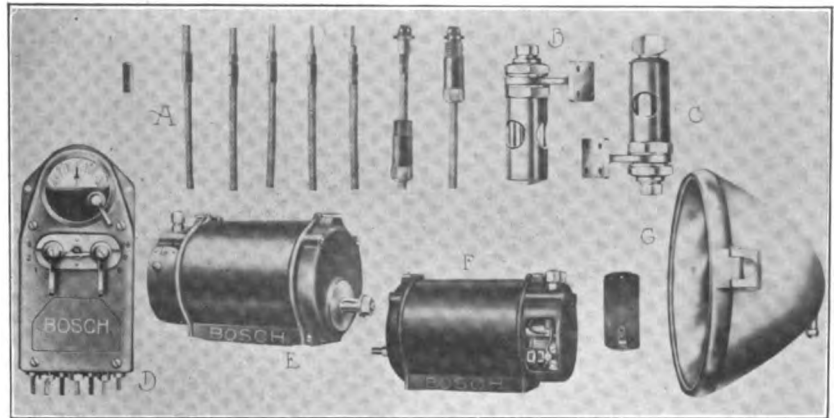
The equipment is most complete, including as it does, the dynamo, switchboard, lamps, wiring, terminals, etc. One of the qualities of the design of the dynamo is that it closely follows the lines of the Bosch magneto; that is, the base plate is provided with dowel pins which register with the dowels of the generator. The plate is also provided with anchor straps. The height of the armature shaft from the base is such that it may be driven from the magneto coupling. One of the features of the mounting is that the holding strap is clamped by a single screw, permitting rapid dismounting.

The dynamo itself is of the shunt wound type, and the excitation of the field magnets is governed by an automatic controller of the electro-magnetic type carried in the switchboard. This controller reduces the strength of the field as the speed increases and conversely increases the field strength as the speed decreases, thus maintaining the output of the dynamo constant. The output of the dynamo is stated to be 12 volts, and its normal output 100 watts, or 7.5 amperes at 13.5 volts. This is attained at approximately 650 revolutions a minute. A test is cited in which, at an engine speed of 400 revolutions a minute the dynamo still generated, and between that speed and 3500 revolutions a minute the lamps could be switched on and off in any combination while receiving current directly from the dynamo without the use of the battery.

The Bosch dynamo is shown in an accompanying illustration with one of the brush gear covers displaced. This brush construction is retained by a single screw, and beside it will be noted one of the terminals of the type used throughout the system. These terminals are all interchangeable insofar as size is concerned, but

to prevent error in making connections, should the wiring be dismantled, each terminal is numbered to correspond with the number of its socket. These terminals are so arranged that the outer metallic casing of the cable forms the ground. It is stated that they cannot work loose or be over-tightened.

The switchboard is of novel construction. The dial of the instrument reads to right or left of zero, according to whether it shows "charge" or "discharge", and the switch is moved to one side to show voltage and to the other to indicate amperage, the same dial and calibration serving for both readings. The lower right hand switch is shown in the "off" position. D indicates that the current is switched direct to the lamps, B that the current is being run to the battery, and D B



Bosch Dynamo Lighting System: A, Terminals and Cables; B, Tail Light; C, Dash Light and Switch; D, Novel Switchboard and Meter; E, Dynamo; F, Brush Gear Cover Displaced to Show Terminal; G, Headlight.

indicates that the battery and dynamo are both in circuit. When the lower left hand switch is placed at "off", 1 indicates the side and tail lights on, 2 head, side and tail lights on, and 3 head and rear lamps on. The centre key is removable, and locks all the switches, which are of the kick type. This makes for convenience, in that the driver is not obliged to stoop when switching on the various combinations.

The lamp sockets are permanently focussed at the factory, and all bulbs are standardized, so that should a bulb be worn out it is necessary only to withdraw it and replace with a new one, when the focus will be found to be correct. The bulb is held in its socket by a spring contact plate in the back of the lamp and connected to the outside terminal. The headlight reflectors are carried in the body of the lamp, while the side light reflectors are in the front glass retainer.

The bulbs are held by bayonet holders. One of the qualities claimed for the headlights is that the light is cast in an exceptionally wide angle, thus illuminating hidden road constructions and curves of the road. In order to prevent unnecessary interference with the reflector the lamp is arranged so that the nut holding the bracket overlaps the screw of the latch.

The tail light shows a red and a white light, and the dash lamp is provided with a button

form of switch at its top for those who prefer not to have the light always on at night while driving.

One of the features of the Bosch system is that the dynamo is designed to be operated at engine speed. It may be driven by shaft, chain, etc., as best meets the conditions of installation, and is a separate unit, the Bosch company favoring this construction—one that is distinct from the magneto and starting units.

INAUGURATES NEW POLICY.

Bi-Motor Equipment Company to Conduct Wholesale Business Exclusively.

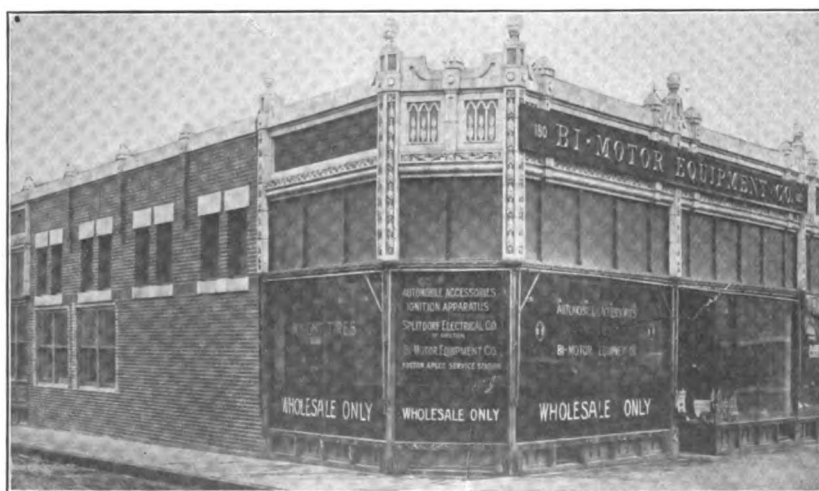
Although the Bi-Motor Equipment Company, Boston, Mass., decided upon its new policy of maintaining an exclusively wholesale accessory supply house on Jan. 1, the work of remodelling the store at 180 Massachusetts avenue was completed only recently. The concern is now in a

latter. The company was the first accessory house to locate on that street, but since its arrival the section has become a decidedly important factor in that end of the industry.

The concern carries all standard lines of accessories and supplies, and at present has eight travelling salesmen in the six states comprising the New England district. The decided increase in the number of garages and supply stores during the past few years has been the means of greatly augmenting the business of the company, and, in a large measure, impelled the decision to confine activities to the wholesale field.

R. S. Preble is president, and as he is also president of Excelsior General Supply Company, Chicago, and Manufacturers' Supply Company, Philadelphia, the concern has a working agreement with these two which has proved very satisfactory from the viewpoint of its customers. H. R. Curtiss is treasurer and R. M. Ellis is general manager.

The building at 180 Massachusetts avenue has been completely remodelled, and particular attention has been paid to facilities for filling orders and making shipments.



Home of Bi-Motor Equipment Company, 180 Massachusetts Avenue, Boston, First Exclusively Wholesale Accessory Dealer in New England.

position to meet the requirements of this trade, and it is maintained that it is the first accessory house in New England to adopt this policy.

The Bi-Motor Equipment Company was organized some six years ago, and started a wholesale and retail business on Portland street. Three men were placed in the field to cover the larger towns and cities of New England, and the success which attended the venture was particularly pleasing in every respect.

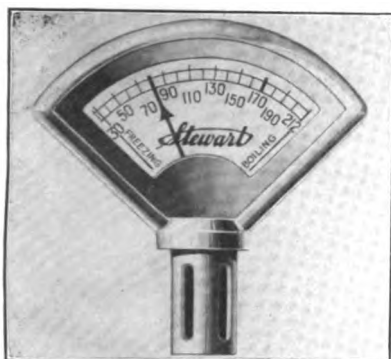
In October, 1912, it was deemed advisable to separate the wholesale and retail ends of the business, and a portion of the present quarters on Massachusetts avenue was acquired for the

AUTO THERMO-METER.

Stewart Radiator Device Indicates Temperature of Water Cooling System.

The Stewart-Warner Speedometer Corporation, Chicago, has brought out a thermostatic temperature indicator, termed the Stewart Auto Thermo-Meter, which is attached to the filler cap of the radiator and registers, by means of a hand passing over a calibrated dial, the temperature of the water cooling system.

One of the qualities of the design emphasized is that a thermostat is utilized and its bar is affected by the temperature of the air over the wa-



Stewart Auto Thermo-Meter.

ter. The heat or cold so actuates this bar that it moves a pointer over a calibrated, glass covered dial. The last named provides for readings from 30 to 212 degrees Fahrenheit, and it is stated that the figures may be read easily from the tonneau. It is also claimed that owing to the pointer hand moving over a curved dial, it is a simple matter to determine its position even when it is so dark that the Thermo-Meter can hardly be distinguished.

The function of the device is to enable the operator to note at a glance the operating conditions of the motor, as it is obvious that with too high a degree of temperature the indicating hand will warn the driver of trouble. Similarly, upon the cooling fluid attaining a temperature in the neighborhood of 32 degrees, the hand will indicate the need of attention to prevent freezing. The Stewart Auto Thermo-Meter is finished in brass or nickel and is moderately priced.

WHO WON SAVANNAH RACE?

Miami Cycle & Manufacturing Company Files Protest with Contest Chairman.

The Miami Cycle & Manufacturing Company, Middletown, O., maker of Flying Merkel motorcycles, has filed a protest with Chairman John L. Donovan of the competition committee of the Federation of American Motorcyclists, against the awarding of the 300-mile Grand Prize motorcycle race at Savannah, Ga., Dec. 27, to Robert Perry of Urbana, Ill., on an Excelsior. It is maintained that the real winner was Maldwyn Jones of Middletown, O., on a Flying Merkel.

Jones is said to have covered the first lap in 13:10, the second in 11:30, the third in 11:15, the fourth in 15:31, the fifth in 12:14 and the sixth in 11:15. After finishing the seventh lap he made his first stop at the pits for oil and gasoline, consuming but 53 seconds. The of-

ficial score shows that the seventh lap was covered in 24:30.

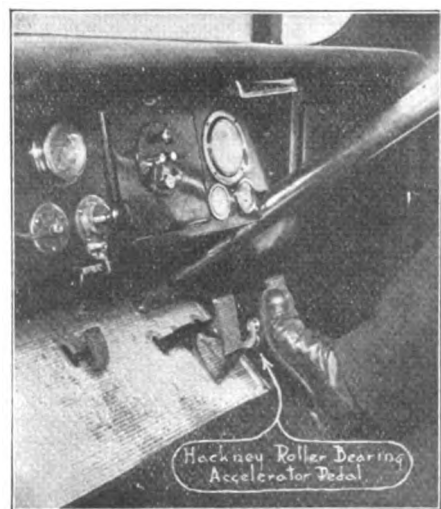
It is maintained by the Miami company that there was only one scorer to five riders, and that for some reason Jones was not cited on this seventh lap, but was required to make 28 laps of the course to Perry's 27. This view of the matter also is held by Mr. Ross, connected with the Indian agency in Cincinnati, O., who had charge of the Indian camp. L. G. Buckner, an Indian rider in the race, has filed a sworn affidavit with the Savannah Motorcycle Club that Jones, whose number was 19, started before him (Buckner), whose number was 38, and at no time in the race did he pass Jones, although Buckner is supposed to have been leading the race up to the 19th lap.

NEW ACCELERATOR PEDAL.

Hackney Design Is Ball Bearing, Simplifying Acceleration Control.

Leslie S. Hackney, St. Paul, Minn., inventor of the Hackney auto plow and designer of light farm tractors, has brought out a roller bearing accelerator pedal, which is shown in an accompanying illustration. It is attached to the regular pedal and permits perfect accelerator control.

Being ball bearing, any pressure applied to it results in an easy and gradual opening of the throttle, and with a minimum of effort upon the part of the driver. It also makes for economy of fuel in that friction is eliminated, which often results in too wide an opening of the throttle with some designs of accelerators. The device is very compact and is easily attached.



Hackney Roller Bearing Accelerator Pedal Simplifying Control.

Mr. Hackney has organized the Roller Bearing Pedal Company of which he is president and owner. General offices have been established in Hackney building, St. Paul, Minn.

NEWS OF THE MANUFACTURER AND DEALER.

The following concerns have been incorporated recently to manufacture or deal in motor vehicles, accessories, etc.:

Cataract Tire & Rubber Company, Providence, R. I.; \$20,000; general automobile and garage business; Clarence H. Broley, George Kirk, Elizabeth E. Broley, Mary Kirk.

Eastman Spring Company, Portland, Me.; \$500,000; to manufacture and deal in motor vehicle springs, etc.; E. V. Noble, E. V. Mann.

Osgood Automobile Deflector Company, Chicago, Ill.; \$50,000; to manufacture automobile accessories; S. W. Osgood, W. C. Kenner, J. J. Sheridan.

Benz Automobile Sales Corporation, New York City; \$25,000; general automobile and garage business; R. L. Enos, S. F. Enos, P. V. Clodio.

Brown & Robb Company, Gloucester City, N. J.; \$100,000; to manufacture automobiles; E. L. Brown, T. H. Robb, Herman Johnson.

Columbia Rubber Company, Boston, Mass.; \$50,000; Patrick H. Crowley, William F. Crowley, Hugh G. Cameron.

Hancock Engineering Company, Boston, Mass.; A. Schyler Clapp, William N. McKenna, John Sears McKenna.

Ceco Cycle Car Sales Company, Augusta, Me.; \$50,000; Ernest L. McLean, E. M. Leavitt.

Hercules Tire Protector Company, Boston, Mass.; \$10,000; John A. Gilbert, Elmer Balod, Adolph E. Elster.

Church Hydroplane Boat & Motor Company, Cambridge, Mass.; \$100,000; James E. Church, Hyman Pill, L. Levy.

Ontario Tire & Rubber Company, Inc., Buffalo, N. Y.; \$50,000; to deal in tires and rubber goods; H. V. Cook, F. L. Robinson, F. B. Rowley.

Keller Cyclecar Corporation, Wilmington, Del.; \$250,000; to manufacture cyclecars, motor trucks, airships, etc.; H. E. Latter, W. J. Maloney, O. J. Reichard.

Wilshire Auto Company, Los Angeles, Cal.; \$25,000; J. E. Price, Helen Smith, Walter Kerrick.

Allen Automobile Company, Evansville, Ind.; \$10,000; to conduct a general automobile business; C. A. Hughes, A. Underwood, G. C. Allen.

Manufacturers & Dealers Motor Underwriters, Inc., New York City; \$150,000; insurance, repair and reconstruct automobiles, etc.; E. Greenwood, W. E. Metzger, H. W. Henderson.

C. A. Coey Motor Company, Chicago, Ill.; \$50,000; to manufacture automobiles and accessories; C. A. Coey, H. L. Wells, H. H. Morgan.

E. & C. Auto Sales Company, Plainfield, N. J.; \$25,000; to do a general automobile business; F. Endress, E. A. Craig, L. A. Endress.

Levano Auto Supply Company of Houston, Houston, Tex.; \$20,000; H. M. Levano, M. Levano, J. L. Pujol.

Indiana Auto Supply Company, Laporte, Ind.; \$10,000; auto and repair business; Arthur Gaul, William Pelz, Alex Lindgren.

J. J. Laverty & Co., New Haven, Conn.; \$50,000; to deal in automobiles; John L. Laverty, Marie A. Wells, Frederick U. Wells.

Park Garage Company, Somerville, Mass.; \$10,000; Arthur N. Park, F. R. Curtis, W. W. Kennard.

H. Ross Maddocks Company, Boston, Mass.; \$25,000; to manufacture and deal in motor vehicles; H. R. Maddocks, Charles West, J. A. Maddocks.

Burgess Company, Marblehead, Mass.; \$100,000; to manufacture aeroplanes, boats, motors, etc.; W. Starling Burgess, Greeley S. Curtis, F. H. Russell.

Goodby-Rankin Company, Providence, R. I.; \$40,000; to manufacture accessories and supplies for automobiles, motorcycles and bicycles; also buying and selling automobiles, motorcycles and bicycles; Albert E. Goodby, William G. Rankin, Thomas P. Himes.

Park Square Motor Company, Pittsfield, Mass.; \$15,000; Fred K. Chaffee, Leslie M. Cain, Charles E. Jenks.

Cyclecar Distributing Company, Passaic, N. J.; \$60,000; hiring of cyclecars, auto vehicles, etc.; E. Huebner, G. Raradash, P. Miskovsky.

Victor Tire & Rubber Company, Camden, N. J.; \$125,000; to manufacture automobile tires, etc.; T. Skinner, H. V. Williams, E. P. Cropper.

Holl Motor Carriage Service Company, Camden, N. J.;

\$125,000; to manufacture automobiles, motorcycles, etc.; A. H. Holl, H. C. Henry, L. F. Holl.

Dayton Cycle Car Company, Joliet, Ill.; \$50,000; to manufacture and deal in automobiles; T. J. Moore, J. Storch, T. F. Donovan.

Standard Tractor Company, New York City; \$50,000; to manufacture and deal in motors, engines, tractors and machinery; J. W. Blaisdell, G. T. Whyte, D. H. Hamje.

Quick Change Storage Battery Company, Albany, N. Y.; \$500,000.

Auto Signalite Export Company, New York City; \$10,000; H. J. Woodsmith and others.

GARAGE AND DEALER.

The Pathfinder Motor Car Company, St. Louis, Mo., has taken over the building at 4160 Olive street, formerly occupied by the Cole Motor Company of Missouri. The company has a branch at 6417 Michigan avenue.

C. Baker, Cleveland, president of the American Ball Bearing Company, and formerly head of the Baker Motor Vehicle Company, is interested in a plan to establish a garage in that city, and the matter has been taken up with the Cleveland Automobile Club.

The Havers Motor Car Company, Port Huron, Mich., maker of Havers cars, has opened a sales branch at Detroit, on Woodward avenue.

The Apperson Bros. Auto Company, Kokomo, Ind., has opened a sales branch at Seattle, Wash., in charge of D. C. Gulehard.

The Firestone Tire & Rubber Company, Minneapolis, Minn., has moved into new and larger quarters at 1635 Hennepin avenue.

The Brasher Motor Car Company, Columbus, O., is having the building at the corner of Fourth and Gay streets remodelled for its use. U. D. Armstrong is general manager.

S. H. Stoneburner, Upper Sandusky, O., has purchased a half-interest in the Sawyer Motor Company and the name will be changed to the Upper Sandusky Overland Company.

The Moreland Motor Truck Company, San Francisco, Cal., has opened a factory branch at Fourth and Harrison streets.

V. A. Neilson has accepted the position of superintendent of the mechanical department of the Splittdorf & Apple Company, Chicago. For the past three years he has been associated with the New England branch of the Inter-State Automobile Company in Boston.

M. C. Hutte, Jacksonville, Fla., has opened a repair shop and garage in South Jacksonville.

The Kruse Motor Car Company, Cincinnati, O., will remove into its new and larger building at Eighth street and Broadway.

E. B. Sutton, Saginaw, Mich., formerly with the Belt Top Auto Company, is now engaged in the automobile business at 823 Genesee street.

The Calcasieu Motor Company, New Orleans, La., has purchased a new site and will erect a new brick garage to cost \$8000.

The Mangles-Kirby Company, Jacksonville, Fla., has leased the building at 17 East Church street, and will remove to that address at once.

James Mudge, Des Moines, Ia., is to open a new repair shop at 413 12th street.

Tauber & Tucker, Minneapolis, Minn., has opened a garage at 195 Western avenue.

Green's Purchasing Agency, New York City, distributor of Metz cars, has removed to new quarters at 62nd street and Central Park, West.

The Montauk Garage & Sales Company, Brooklyn, N. Y., agent for Jeffery, Pope-Hartford and Henderson cars, has moved into its new building at 1495 Bedford avenue.

The Mount Holly Garage, Mount Holly, N. J., has been sold to Sam P. Gokder and Horace C. Greems, who will continue the business.

The Leader Garage has been opened in Cumberland, Md.

D. L. Bennett & Son, Corning, Ark., is to erect a new garage on East Elm street. All modern machinery will be installed. The concern handles Ford cars.

Fred M. Case and **J. T. Stephens**, Hickman, Ky., have

formed a partnership and will engage in the automobile business. A new modern garage will be built.

The Prospect-Bulck Company, Akron, O., has opened a new garage at 216 East Market street.

The Motor Supply Shop, Columbus, O., has taken over the Motor Supply & Tire Company and is erecting a new four-story building at 128 East Gay street.

F. J. Dyett, Ilion, N. Y., has sold his garage to J. G. Stratton, who has taken possession.

J. S. Tony, Willows, Cal., has opened an automobile business at 429 West Oak street.

B. E. Terkelsen, Springfield, Mass., has opened a repair shop at 717 Main street.

The Ames Post Garage, Catskill, N. Y., is having plans prepared for the erection of an addition to its building on Church street. The concern handles the Cadillac and Overland cars.

The Webb Auto Company, San Angelo, Tex., has removed into the remodelled building on East Conche avenue.

W. R. Whitake, Marble Falls, Tex., has purchased an interest in the City garage. A new large building is to be erected.

The Chemi Company, Richmond, Va., which operates an automobile supply store, has opened a branch at Norfolk, Va., located at 723 Granby street. The company was incorporated last August.

H. W. C. Struebling, Sheboygan, Wis., who formerly operated a garage at 10th street and Michigan avenue, has purchased the August Prange garage on North Ninth street. Prange will remain with Struebling as salesman.

J. P. Wooten, Albine, Tex., has purchased the Majors garage on North Second street, and will conduct it under the name of J. P. Wooten & Son. The stock of accessories and supplies will be increased.

G. A. Lien, Columbus, Wis., has sold a half-interest in his garage and salesrooms to Fred Behncke and the firm hereafter will be known as Lien & Behncke. It is agent for Buick and Chalmers cars.

J. E. Cohagen, Hedrick, Ia., has taken over the garage business of R. T. McClain & Son at Fairfield, Ia. In his new location he will handle Buick, Studebaker and White cars.

Guy W. Campbell and his brother, C. W. Campbell, Waterloo, Ia., who conducted a motorcycle agency, have entered the automobile trade. They are now agents for Saxon cars.

J. R. Harris, Normal, Ill., has sold his half-interest in the Normal garage to his partner, P. E. Herr.

Lawton Ford Company is the name of a new firm in Lawton, Okla., in which E. W. Kirkpatrick and R. A. Parkinson are interested.

The Bee Automobile Company, Allentown, Penn., has been formed. It will be located at 17 North Church street and will make a specialty of body building.

Jerome Terwilliger & Son, Clinton, Wis., has opened a garage and salesrooms in the new Terwilliger building on Main street. A complete repair shop is connected with the garage.

Prothero & McGinnis, Baraboo, Wis., has leased the Dells garage in Kilbourn, Wis., and will conduct it in connection with the one at Baraboo.

WITH THE MANUFACTURERS.

The Oakes Pressed Steel Company, Indianapolis, Ind., maker of metal stampings of all descriptions, has found it necessary to remove into the enlarged plant at the corner of Division street and the Vandalia railroad, shown in the accompanying illustration. This action is the result of rapidly expanding business activities.

The Fisher Manufacturing Company, Lincoln, Neb., which manufactures the Rim-Grip sub-casing, a device designed to prolong the life of automobile tires, has announced its intention of erecting a second factory on the Pacific Coast. It is the purpose of the company eventually to invade the East, and locate a third plant in some centrally located city on the Atlantic seaboard.

The American Manufacturing Company, Lexington,

Tenn., has taken control of the manufacture of the Partin-Palmer motor car at the plant at Ecorse, Mich., recently operated by the Partin-Palmer Motor Car Company, Detroit.

The Dominion Motor Car Company, St. John, N. B., has leased property adjoining the Ford plant at Coldbrook, and will erect a large factory on the site for the manufacture of automobiles.

The New Haven Welding Company, New Haven, Conn., will enlarge its plant and thereby facilitate better handling of its products. The company is located at 67 Broadway.

The Golden West Motors Company, Sacramento, Cal., has the first unit of its large building completed, and the second unit will be ready in the early spring. That portion of the plant now ready for occupancy is 30x100, and the one being rushed to completion is 100x200.

McQuay & Norris, St. Louis, Mo., will soon move into its new factory, which is nearing completion. The company manufactures Leak-Proof piston rings.

The Perfex Company, Los Angeles, Cal., is now located in its new plant at Santa Fe avenue and 52nd street. The entire efforts of the company will henceforth be directed toward the production of a 1000-pound light delivery car for retail merchants. The new plant has a capacity of 30 cars a month.

The Willys-Overland Company, Toledo, O., has ordered payment by check to be made every week, instead of paying its employees twice a month, as heretofore. The National Bank of Commerce, of that city, has made arrangements to cash these checks with a special force



New Plant of the Oakes Pressed Steel Company, Indianapolis, Ind.

which will be kept on hand to pay out the \$125,000 of the weekly payroll. Before the new system was inaugurated the bank had to transport \$250,000 in cash, guarded by heavily armed policemen, every two weeks to the Overland plant.

The F. L. Moore Truck Company, Torrance, Cal., is now working to its fullest capacity, 125 men being employed. With the new machinery that has been installed it is expected that the output of the factory will approximate close to \$100,000 a month.

E. B. Gregg, New Castle, Penn., is said to have bought the plant of the Motor Car Company of that city. The property is valued at \$90,000. Mr. Gregg was formerly sales manager of this company and it is understood that he intends to operate the factory in a very short time.

A. C. Barley, Chicago, has purchased the factory of the Halladay Company at Streator, Ill., and is expected to resume the manufacture of the Halladay automobiles.

C. P. Kell, San Francisco, Cal., is interested in a large factory to be erected at Oakland, Cal., for the manufacture of commercial vehicles.

The Corsair Motor Company, Detroit, of which F. V. Whyland is the head, has secured office headquarters at 315 Free Press building. The company produces the Corsair motor, designed for the cycle and light car trade.

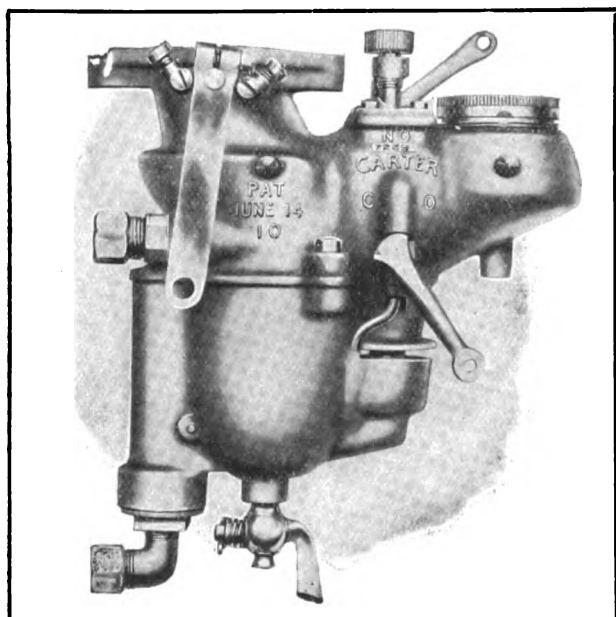
I. D. Rodecap, Detroit, who began in 1908 as production manager of the E-M-F Company and who for the last 2.5 years has been chief engineer, factory manager and purchasing agent of the Alpena Motor Car Company, has become production manager of the Lincoln Motor Car Company of that city.

TAKES OVER CARTER.

H. W. Johns-Manville Company to Handle This Make of Carburetor.

The H. W. Johns-Manville Company, New York City, which concern has taken over the sale and manufacturing control of a number of the best known motor car accessories marketed, announces that it has secured the Carter carburetor, manufactured by the Carter Carburetor Company, St. Louis, Mo.

The Carter differs from conventional forms of carburetors in that the supply of fuel is controlled by the suction of the piston of the motor instead of a mechanical device, and one of the qualities emphasized is its immediate response



Carter Carburetor, Having a Multiplicity of Jets, the Extreme Flexibility and Economy of Which Are Emphasized.

to the motor's demand when accelerating. This quick response is appreciated when traversing in crowded traffic. It is also stated that the supply is as quickly cut off when the throttle is closed, thereby saving fuel.

Economy of gasoline is claimed to be at least 30 per cent. by the method employed in breaking the fluid up into a fine mist. This is obtained by the use of a vertical multiple jet tube located in the funnel, and pierced with a number of small jets arranged spirally. As a vacuum is created by the motor, the fuel rises and falls instantaneously in the tube, according to engine speeds. Instead of being sucked through one or two jets, as in conventional practise, the gasoline emerges

through 16 openings. Owing to the size of the jets and the force with which the fluid emerges, the gasoline is broken up into minute particles and converted into a mist, which blends with the air, making a homogeneous mixture.

A feature of the Carter is the use of a by-pass priming device, which supplies a rich mixture for starting when the motor is cold. It is stated by the maker that it is possible to start on quarter-turns in very low temperatures.

Atmospheric changes are compensated for by means of a lever control, attached to the steering post. This lever is convenient to the driver and permits of regulating the supply of air. The Carter is said to provide flexibility and to make for economy, two important factors in operation.

COMING EVENTS.

March.

- March 2-4—Truck show, Cincinnati, O.
- March 2-6—Show, Fort Dodge, Ia.
- March 2-7—Show, Utica, N. Y.
- March 2-7—Show, Sioux City, Ia.
- March 3-6—Show, Grand Forks, N. D.
- March 4-7—Show, Cortland, N. Y.
- March 4-7—Show, Tiffin, O.
- March 5-7—Show, Elgin, Ill.
- March 7-14—Pleasure car show, Mechanics' building, Boston, Mass.
- March 7-14—Show, Hamilton, Ont.
- March 9-14—Show, Des Moines, Ia.
- March 17-21—Truck show, Mechanics' building, Boston, Mass.
- March 21-28—Show, St. John, N. B.

April.

- April 9-15—Show, Manchester, N. H.
- April 12—Show, Palermo, Italy.
- April 12-19—Show, Vienna, Austria.
- April 22—Track races, Bakersfield, Cal.

May.

- May 24-25—Targa Florio race, Italy.
- May 30—500-mile race, Indianapolis, Ind.
- May 30—Track meet, New York City.
- May 30—Track races, Providence, R. I.

June.

- June 6-7—Track meet, St. Louis, Mo.
- June 9-11—Isle of Man road race.
- June 17-18—Hill climb, Uniontown, Penn.
- June 30—Track races, Sioux City, Ia.

July.

- July 3-4—Road races, Tacoma, Wash.
- July 4—Track races, Providence, R. I.
- July 4—300-mile race, Sioux City, Ia.
- July 4—Grand Prix, Lyons, France.
- July 17-18—Speedway meet, Seattle, Wash.
- July 25-26—Grand Prix, Belgium.

August.

- Aug. 28-29—Road races, Elgin, Ill.

September.

- Sept. 5—Track races, Milwaukee, Wis.
- Sept. 7—Track races, Providence, R. I.
- Sept. 9—Speedway races, Pomona, Cal.
- Sept. 9—Road races, Corona, Cal.
- Sept. 9—Grand Prix, Italy.

October.

- Oct. 2-3—Track meet, Oklahoma City, Okla.
- Oct. 2-3—Track meet, Trenton, N. J.
- Oct. 4-10—International show, Berlin.
- Oct. 16-26—Automobile Salon, Paris.

November.

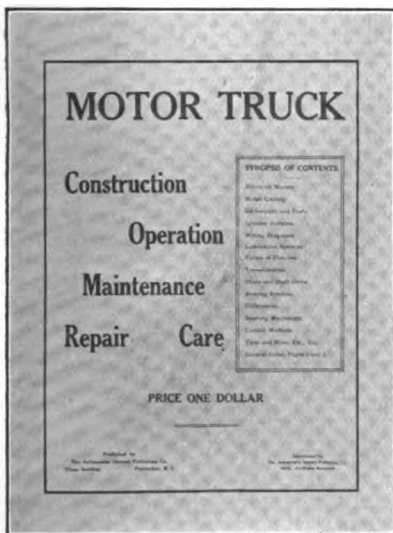
- Nov. 6-16—Olympia show, London.
- Nov. 8-11—Track meet, Shreveport, La.

100% EFFECTIVE**GAULOIS TIRE CORP.**

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A new work and the only one of the kind published. Just completed—written by experts—fully illustrated—hundreds of illustrations, line plate and charts.

All having anything to do with the business wagon, whether owner, operator or repairman, should have a copy of this discussion.

PRICE \$1.00 Postpaid**The Motor Truck**

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Model 440—4 H. P., Belt Drive, Single Cylinder,	\$210.00
Model 441—4 H. P., Chain Drive, Single Cylinder,	210.00
Model 470—7 H. P., Belt Drive, Twin Cylinder,	225.00
Model 471—7 H. P., Chain Drive, Twin Cylinder,	225.00
Model 473—7 H. P., Self-Starting "Yellow Jacket" Model,	290.00

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GUARANTEED 1914 MODELS IN CAR-
LOAD LOTS OR LESS.**

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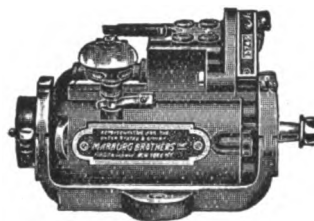
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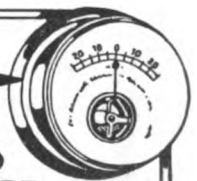
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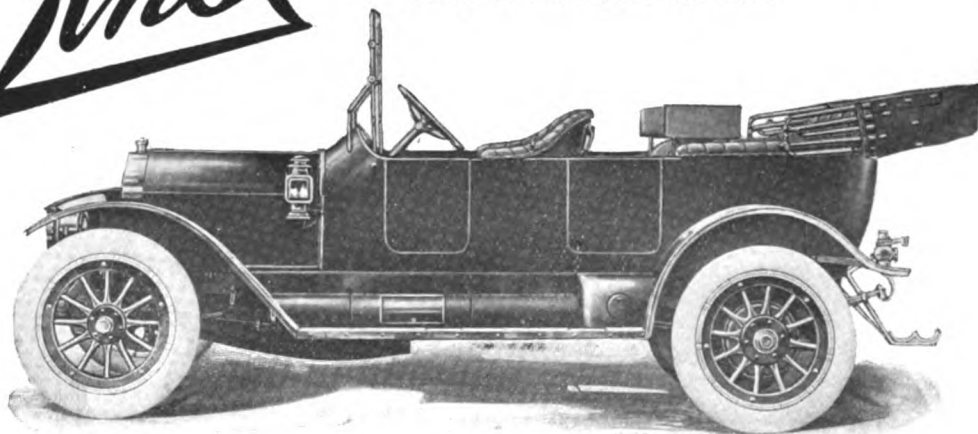
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Branches: 203-204 Columbus Ave., Boston; Bridge and Dwight streets, Springfield, Mass.; 274 Trumbull St., Hartford, Conn.; 924 Elghth Ave. and 2782 Broadway, New York; 1421 Bedford Ave., Brooklyn, N. Y.; 318 North Broad St., Philadelphia; 824 Main St., Buffalo, N. Y.; 1829 Euclid Ave., Cleveland; 227 Jefferson St., Detroit; 259 Peachtree St., Atlanta, Ga.; 601-603 Baronne St., New Orleans, La.; 135 Central Ave., Albany, N. Y.; 274 Halsey St., Newark, N. J.

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Motor Parts Co., 185-187 Columbus Ave., Boston; 818 No. Broad St., Philadelphia; Springfield, Mass.

Northwestern Chemical Co., Marietta, O.

Waite Auto Supply Co., 81 Exchange place, Providence.

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Williams Foundry & Machine Co., Akron, O.

AMMETERS AND VOLTMETERS.

Moyt Electrical Instrument Works, Penacook, N. H.

AUTOMOBILES. (See Cars.)

AUTOMOBILE SPECIALTIES.

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Boyd, F. Shirley, 903 Boylston St., Boston. (R. I. V.)

Myatt Roller Bearing Co., Detroit.

Marburg Bros., Inc., 1790 Broadway, New York. (S. R. O.)

New Departure Mfg. Co., Bristol, Conn.

R. I. V. Co., 1771 Broadway, New York. (R. I. V.)

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Gelaster Bros. Storage Battery Co., 514 W. 57th St., New York.

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City. (J-M.)

Waite Auto Supply Co., 81 Exchange place, Providence. (Success.)

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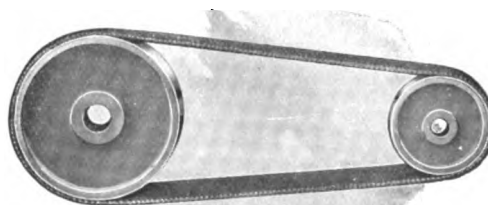
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Williams Foundry & Machine Co., Akron, O.

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Baker Motor Vehicle Co., Cleveland. (Baker.)

CARS—GASOLINE PLEASURE.

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Cartercar Co., Pontiac, Mich. (Cartercar.)

Cole Motor Car Co., Indianapolis, Ind. (Cole.)

Empire Automobile Co., Indianapolis, Ind. (Empire, Little Aristocrat.)

Haynes Automobile Co., 166 Main St., Kokomo, Ind. (Haynes.)

Henderson Motor Car Co., Indianapolis, Ind. (Henderson.)

Jackson Automobile Co., 1400 Main St., Jackson, Mich. (Jackson.)

Knox Automobile Co., Springfield, Mass. (Knox.)

Lexington-Howard Co., Connersville, Ind. (Lexington and Howard.)

Maxwell Motor Co., Inc., Detroit. (Maxwell.)

Mets Company, Waltham, Mass. (Mets.)

Moline Automobile Co., E. Moline, Ill. (Moline.)

National Motor Vehicle Co., 1033 22nd St., Indianapolis. (National.)

Nordyke & Marmen Co., Indianapolis. (Marmon.)

Owen & Co., R. M., 19 W. 62nd St., New York City. (Reo.)

Paige-Detroit Motor Car Co., Detroit. (Paige.)

Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)

Premier Motor Mfg. Co., Indianapolis, Ind. (Premier.)

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Studebaker Corp., Detroit. (Studebaker.)

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White Co., The, 328 E. 79th St., Cleveland. (White.)
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Willys-Overland Co., Toledo, O. (Overland.)

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White Co., The, 328 E. 79th St., Cleveland. (White.)
 Branches: See Cars—Gasoline Pleasure.

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Adams Bros. Co., Findlay, O. (Adams.)
Bessemer Motor Truck Co., Grove City, Penn. (Bessemer.)
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Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)
Reo Motor Car Co., Lansing, Mich. (Reo.)
Studebaker Corp., Detroit. (Studebaker.)
Sullivan Motor Car Co., 1707 East Ave., Rochester, N. Y. (Sullivan.)
Tarrytown Motor Car Co., Inc., 1790 Broadway, New York City. (MotoKart.)
Willys-Overland Co., Toledo, O. (Overland.)

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Baker Motor Vehicle Co., Cleveland. (Baker.)
Couple-Gear Freight-Wheel Co., 575 Buchanan St., Grand Rapids, Mich. (Couple-Gear.)
 Branches: 30th floor, Singer Bldg., New York; 173 Devonshire St., Boston.
General Motors Truck Co., 26 Cadillac Ave., Pontiac, Mich. (GMC.)
 Branches: See Cars—Gasoline Commercial.
General Vehicle Co., Long Island City, N. Y. (G. V.)

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 Branches: See Cars—Electric Commercial.
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White Co., The, 328 E. 79th St., Cleveland. (White.)
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Branches: See Accessory Manufacturers and Jobbers.

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Heinze Electric Co., Lowell, Mass.

CYLINDER CLEANING COMPOUND.

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.

Milwaukee Auto Specialty Co., 128 Second St., Milwaukee.

Northwestern Chemical Co., Marietta, O. (Carbonox.)

Prest-O-Lite Company, 226 Speedway, Indianapolis. (Prest-O-Carbon Remover.)

Branches: Atlanta, Baltimore, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Indianapolis, Jacksonville, Kansas City, Los Angeles, Milwaukee, Minneapolis, New York, Omaha, Philadelphia, Pittsburg, Providence, San Francisco, Seattle, St. Louis and St. Paul.

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Pyrene Co. of New England, 176 Federal St., Boston.

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Shawver Co., Springfield, O.

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Ross Gear & Tool Co., 794 Heath St., Lafayette, Ind.

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HORNS.

Dean Electric Co., Elyria, O. (Tuto.)

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

Kent Mfg. Works, Atwater, 4937 Stenton Ave., Wayne Junction, Philadelphia. (Monoplex.)

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(BUYERS' GUIDE—Continued.)

IGNITION EQUIPMENT.

Kent Mfg. Works, Atwater, 4937 Stenton Ave., Wayne Junction, Philadelphia.

INSULATION.

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

JACKS, ETC.

Shawver Co., Springfield, O.

LAMP COVERS.

Hopewell Brothers, Newton, Mass. (Hopewell.)
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Apple Electric Co., Dayton, O. (Apelco.)

Dean Electric Co., Elyria, O. (Dynalux.)

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

Remy Electric Co., Anderson, Ind. (Remy.)

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Berne, Scrymgeour Co., 80 South St., New York. (Colonial.)
Branches: Boston, Fall River, Philadelphia.

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Eagle Oil & Supply Co., 104 Broad St., Boston. (Eagle-line No-Karbon.)

Harris Oil Co., A. W., 326 South Water St., Providence. (Harris.)

Branch: 143 No. Wabash Ave., Chicago.

Hawa, Geo. A., 148 Front St., New York. (Panhard.)
Branch: 899 Boylston St., Boston.

Indian Refining Co., 17 Battery Place, New York. (Distributors of Havoline Oil.)

Branches: Pacific Coast—Kohl Bldg., San Francisco; Western—People's Gas Building, Chicago; Southern—Title Guarantee & Trust Bldg., Birmingham, Ala.; First National Bank Bldg., Cincinnati, O.; Lynchburg, Va.; St. Paul.

Invader Oil Co., 80 Broad St., New York. (Invader.)
Branches: 284 Columbus Ave., Boston; 113 Arch St., Philadelphia; 512 Kenos Bldg., 11th and G Sts., N. W., Washington, D. C.

Miller, Chas. E., 97-103 Reade St., New York. (Pan-American.)
Branches: See Accessory Manufacturers.

New York & New Jersey Lubricant Co., 165 Broadway, New York. (MoToRol, Non-Fluid, Kejex.)

Northwestern Chemical Co., Marietta, O. (Gear-Silence.)

Standard Oil Co., New York. (Polarine.)

Branches: In all cities.

Texas Company, The, 7 West St., New York.
Branches: Boston, Philadelphia, Chicago, St. Louis, Norfolk, Atlanta, New Orleans, Dallas, El Paso, Pueblo, Tulsa, Houston.

Vacuum Oil Co., Rochester, N. Y. (Mobiloil.)
Branches: 49 Federal St., Boston; 29 Broadway, New York; Fourth and Chestnut Sts., Philadelphia; 154 Exchange St., Bangor, Me.; 406 Hitchcock Bldg., Springfield, Mass.; 117 Commercial St., Portland, Me.; Fisher Bldg., Chicago; Ford Bldg., Detroit; Indiana Pythian Bldg., Indianapolis.

Valvoline Oil Co., 27 State St., Boston. (Valvoline.)

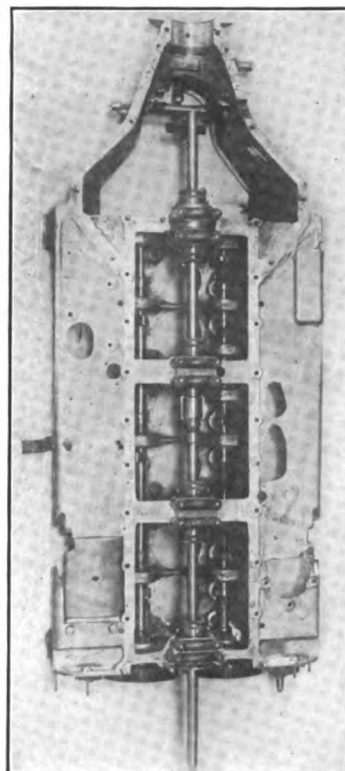
MAGNETOS AND SUPPLIES.

Bosch Magneto Co., 225-226 W. 46th St., New York.

(Continued on Next Page.)

When Writing to Advertisers, Please Mention The Automobile Journal.

Garage and Repairmen The Martell Aligning Reamer



Reamer in use on Packard "6" 1912. This job completed in 11 hours, including fitting connecting rods. How long would it take by hand, bearing in mind that absolute accuracy was maintained?

THE only device made by which a series of bearings may be perfectly aligned.

ADAPTABLE to any type or form of motor.

USE not restricted by any details of construction.

A high grade tool made from the finest of imported steel. A device that every up-to-date garage and repair shop should have.

Range of sizes from 1 5-8 inches to 2 1-4 inches. Send for catalog.

Martell Motor Company

1928 Columbus Avenue, Boston, Mass.



The Lincoln Highway Does not pass through my town

Why should I worry about the Lincoln Highway? I'd have to drive about 300 miles to get to it, and such a thing as devoting the time and money for a long tour is beyond me.

A Question:

Why should I contribute my little mite to this great Ten Million Dollar enterprise? I am not a sport. I am just an ordinary individual, clothing and feeding a moderate family and educating my children. By plugging hard six days in the week I am able to keep out of debt and keep money enough in the bank to buy a new tire occasionally. About the only diversion I have is romping with the kids and piling them and the good wife into the back of the machine and hiking out for a short ride in the country in the late afternoon. Dad is fortunate enough to own an old car and able to buy gasoline enough to keep it going.

The Answer:

Just the same, I am mighty glad if the little \$5 I can pinch out of my earnings will help make it a success. I expect to live several years yet, and I never expect to be without a motor car. I have been dreaming of the time when all our roads will be good, when I can drive 20 miles into the country without accumulating a bunch of expense for repairs. In a word, I want good roads and I want them so badly I can taste the desire. I know that when the Lincoln Highway is put through it will not be five years until every road of consequence in this broad land is a good road. It will spread a whole network of good roads. I will be personally benefited just as if it passed my door.

An Argument

Do you want cheaper hauling of farm products? Do you want a lower cost of vegetables, meats, everything that goes on your table? Do you want a more prosperous land to live in? If you want any of these things you want good roads, and in all the agitation for good roads there has been no movement that carries with it so much of promise for the immediate future as this Lincoln Highway.

Send your contribution to this patriotic cause TODAY to

THE LINCOLN HIGHWAY ASSOCIATION

Detroit, Michigan

Space contributed by THE AUTOMOBILE JOURNAL

Copy contributed by Russel M. Seeds, Seeds Advertising Agency, Indianapolis.

(BUYERS' GUIDE—Continued.)

Branches: 119-121 E. 24th St., Chicago; 1250 Woodward Ave., Detroit; 357 Van Ness Ave., San Francisco.

Eisemann Magnete Co., 225-227 W. 57th St., New York City. (Eisemann.)

Branches: 514 No. Capitol Ave., Indianapolis; 303 Woodward Ave., Detroit.

Heinze Electric Co., Lowell, Mass. (Heco.)

Marburg Bros., 1790 Broadway, New York. (Mea.)

Remy Electric Co., Anderson, Ind. (Remy.)

Splittdorf Electrical Co., 98 Warren St., Newark, N. J.
Branches: 10-20 W. 63rd St., New York; 1110 S. Michigan Ave., Chicago; 180-182 Massachusetts Ave., Boston; 1028 Geary St., San Francisco; 973 Woodward Ave., Detroit; 1228 S. Olive St., Los Angeles, Cal.; S. W. Corner Cherry and Juniper Sts., Philadelphia; 1323 Grand Ave., Kansas City; 1628 Broadway, Seattle, Wash.; London, Eng.; Buenos Aires.

MAILING LISTS.

Owners' Auto List Co., Albany, N. Y.

MASTER VIBRATORS.

New York Coil Co., 338 Pearl St., New York City.

MEASURES.

Dever Stamping & Manufacturing Co., Cambridge, Mass. (Auto and Savol.)

METERS, ETC.

Kent Mfg. Works, Atwater, 4937 Stenton Ave., Wayne Junction, Philadelphia. (Kent Pocket.)
Northwestern Chemical Co., Marietta, O. (Hydrometers and Thermometers.)

MOTORCYCLES AND SUPPLIES.

Miami Cycle & Manufacturing Co., 320 Hanover St., Middletown, O. (Flying Merkel.)

MOTOR STARTERS.

Apple Electric Co., Dayton, O. (Apelco.)
Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.
Remy Electric Co., Anderson, Ind. (Remy.)

PACKING, FIRE.

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

PAINT, ANTI-RUST.

Northwestern Chemical Co., Marietta, O. (Never-Rust.)

POLISH.

International Metal Polish Co., Quill St. and Belt R. R., Indianapolis, Ind. (Blue Ribbon.)

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

Northwestern Chemical Co., Marietta, O.

PRIMERS.

Duelec Vaporizing Primer Co., 14 North Broadway, Yonkers, N. Y. (Duelec Vaporizing.)

PUBLICATIONS, AUTOMOBILE.

The Automobile Journal, 24 issues, \$1.00 the year.

The Motor Truck (Commercial Car), Monthly, \$2.00 the year.

The Accessory and Garage Journal, Monthly, \$2.00 the year.

(Continued on Next Page.)

When Writing to Advertisers, Please Mention The Automobile Journal.

(BUYERS' GUIDE—Continued.)

Motor Truck Construction, Operation, Care and Repair	\$1.00
The A B C of Aerial Navigation	\$1.00
The A B C of Motor Car Operation .....	.50
Overhauling, Rebuilding and Equipping the Motor Car .....	.50
Lighting the Motor Car by Electricity .....	.50
The A B C of Internal Combustion Engine Maintenance and Repair .....	.35
The A B C of Carburetor Construction, Maintenance and Repair .....	.35
The A B C of Magneto Systems .....	.35
The A B C of Battery Ignition Systems .....	.35
The Motorcycle, Maintenance, Repair and Construction .....	.35
The A B C of Motor Car Chassis Maintenance and Repair .....	.25
Maintenance and Repair of Motor Car Tires .....	.25
Sent Postpaid to any address in United States upon receipt of price. Address all communications to The Automobile Journal, Pawtucket, R. I.	

PULLERS, WHEEL AND GEAR.

Crane Puller Co., Arlington, Mass.

PUMPS, OIL AND GREASE.

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.

PUMPS, TIRE.

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.
Green & Swett Co., 737 Boylston St., Boston. (Tri-Phoon Car and Garage.)
Shawver Co., Springfield, O.

REAMERS.

Martell Motor Co., 1928 Columbus Ave., Boston. (Martell Aligning.)

RIMS—REMOVABLE AND DETACHABLE.

Boyd, F. Shirley, 903 Boylston St., Boston. (Dorian.)
United States Tire Co., Broadway and 58th St., New York. (Continental and Whittlessey Demountable.)
Branches: New York, Chicago, San Francisco.

ROAD BUILDING MATERIALS.

Barrett Manufacturing Co., New York. (Tarvia.)
Branches: Chicago, Philadelphia, Boston, St. Louis, Cleveland, Pittsburgh, Cincinnati, Kansas City, Minneapolis, New Orleans, Birmingham, Ala.; Seattle, London, Eng.; Montreal, Toronto, Winnipeg. Vancouver, Can.; St. John, N. B.; Halifax, N. S.

SELF-STARTERS. (See Motor Starters.)

SHIELDS, MOTOR.

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City. (Asbestos.)

SHOCK ABSORBERS AND SUPPLEMENTARY SPRINGS.

Boyd, F. Shirley, 903 Boylston St., Boston.
(Continued on Next Page.)

When Writing to Advertisers, Please Mention The Automobile Journal.

J. M. The proved—
and approved—
Shock Absorber

The sign
of class

wherever cars run

And the assurance
of comfort.



No shock absorber has ever offered more definite, conclusive proofs of real service than we send for the asking. Simply write for the Ovington Data Chart "D", the eight simple lines of which—drawn by the car itself—tell the whole story.

No other shock absorber is so largely imitated. Trust the imitators to know what the public wants—or try to give them something that looks like it even if it fails to do the work.

The J. M. Shock Absorber Co., Inc.

Main Office and American Factory:

210 South 17th St., Philadelphia, Pa.

BRANCHES: New York, N. Y., 218 W. 84th St.; Chicago, Ill., 1467 Michigan Ave.; Buffalo, N. Y., 846 Main St.; Pittsburgh, Pa., 5919 Baum St.; Atlantic City, N. J., 12 S. Virginia Ave.; Baltimore, Md., 10 W. Eager St.; Washington, D. C., 1803 M St., N. W.; Hartford, Conn., 230 Main St.; Cleveland, O., 5908 Euclid Ave.; Cincinnati, O., 801 Main St.; Boston, Mass., 222 Elliot St.; Jacksonville, Fla., Lauro St.; Providence, R. I., 11 Dorrance St.; Newark, N. J., 237 Halsey St.; Brooklyn, N. Y., 143 Rogers Ave.; Albany, N. Y., 288 Central Ave.; Indianapolis, Ind., 425 N. Meridian; Springfield, Mass., 138 Dartmouth Terrace; Altoona, Pa., 1009 Chestnut Ave.; Trenton, N. J., 127 Academy St.; Minneapolis, Minn., Cor. Hennepin and Harmon Place; St. Louis, Mo.; San Francisco, Cal.; Los Angeles, Cal.; Orlando, Fla.; Erie, Pa.; Atlanta, Ga.; Houston, Tex.; Dallas, Tex.; Kansas City, Mo.; Pottstown, Pa.; New Orleans, La.
CANADIAN DISTRIBUTORS: Canadian Fairbanks-Morse Co., Ltd., Montreal, Quebec, Ottawa, Toronto, Ont.; Hamilton, Winnipeg, Man.; Saskatoon, Sask.; Calgary, Alta.; Edmonton, Vancouver and Victoria, B. C.; St. John, N. B.

BRANCHES IN EVERY CIVILIZED COUNTRY



Studebaker

"Accessibility of the motor a leading feature"
 "25"—\$885 "35"—\$1290 "SIX"—\$1550
 All prices for cars fully equipped F. O. B. Detroit.
 STUDEBAKER, - - - DETROIT, MICH.

Vanadium Varnishes are the quickest drying in the world. Save one to five days. Used on America's finest cars.

TRADE **VALENTINE'S** VARNISHES **VALENTINE & COMPANY**
 NEW YORK CHICAGO
 BOSTON TORONTO

New Departure Guaranteed Ball Bearings

American Made for American Trade

THE NEW DEPARTURE MFG. CO. Bristol, Conn.
 Western Branch, 1016-17 Ford Bldg., Detroit



MODEL "66" AUSTIN

Six Cylinders—4 1-2x6—\$4000

Austin Hydraulic Spring Controllers

AUSTIN TWO SPEED AXLE

Some desirable territory still open

AUSTIN AUTOMOBILE CO.

Grand Rapids, Mich.

COLE THE STANDARDIZED CAR

The car that started the stampede to standardization
 A Cole franchise is a valuable asset to any dealer. Find out about it.

Cole Motor Car Co. of Indianapolis

Dayton Airless Tires

Reduce tire expense
 Cannot puncture or blow-out
 Contain no compressed air

SEND FOR FULL PARTICULARS

DAYTON RUBBER MFG. CO., 1011 Kiser St., DAYTON, O.

REMY

STARTS—LIGHTS—IGNITES

Six Volt System Does It All.
 Write for our magneto exchange offer.

REMY ELECTRIC COMPANY, Anderson, Ind.

PAIGE "36"—\$1275
 "25"—\$ 950

Leaders of popular-priced cars—thoroughly built, completely equipped, backed by a strong organization. Specifications and catalog on request.

PAIGE-DETROIT MOTOR CAR CO.
 306 21st Street, Detroit, Michigan

(BUYERS' GUIDE—Continued.)

J. M. Shock Absorber Co., 210 So. 17th St., Philadelphia. (J. M.)

Sager Co., J. H., 271 South Ave., Rochester, N. Y. (Peerless.)

SOAPS.

Hopewell Bros., Newton, Mass. (Paos.)

Branch: 1974 Broadway, New York.

Northwestern Chemical Co., Marietta, O. (Dermalene.)

SPARK PLUGS AND IGNITERS.

Alsten & Goulding Co., 36 Foster St., Worcester, Mass. (Alding.)

Bosch Magneto Co., 223-225 W. 46th St., New York.

Branches: See Magnetos and Magneto Supplies.

Heinze Electric Co., Lowell, Mass. (H. E. Co. Priming.)

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

Mosler, A. R., & Co., P. O. Box M, Mt. Vernon, N. Y. (Split Fire.)

Silvex Company, The, 60 Wall St., New York City. (Bethlehem Five Point.)

Splitdorf Electrical Co., 98 Warren St., Newark, N. J.

Branches: See Magnetos and Magneto Supplies.

SPARK PLUG TERMINALS.

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

SPEEDOMETERS, RECORDERS, ETC.

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City. (Electric.)

Northwestern Chemical Co., Marietta, O. (Hydrometers and Thermometers.)

Stewart-Warner Speedometer Corp., Chicago. (Auto-Meter.)

Branches: 116 Edgewood Ave., Atlanta, Ga.; 925 Boylston St., Boston; 720 Main St., Buffalo; 2420 Michigan Ave., Chicago; 807 Main St., Cincinnati; 2062 Euclid Ave., Cleveland; 1518 Broadway, Denver; 870 Woodward Ave., Detroit; 330 1/2 North Illinois St., Indianapolis; 1613 Grand Ave., Kansas City; 748 S. Olive St., Los Angeles, Cal.; 1902 Broadway, New York; 802 N. Broad St., Philadelphia; 5940 Kirkwood Ave., Pittsburgh; 14 N. Seventh St., Portland, Ore.; 26-38 Van Ness Ave., San Francisco; 611 E. Pike St., Seattle, Wash.; 3923 Olive St., St. Louis; 559 Yonge St., Toronto, Can.

SPRINGS FOR AUTOMOBILE SUSPENSION.

Marburg Bros., Inc., 1790 Broadway, New York. (Marburg-Hagen.)

SPROCKETS.

Boyd, F. Shirley, 903 Boylston St., Boston. (Baldwin.)

STEEL, ETC.

Ward's Sons, E. T., 25 Purchase St., Boston, Mass. (Seamless.)

(Continued on Next Page.)

When Writing to Advertisers, Please Mention The Automobile Journal.

(BUYERS' GUIDE—Continued.)

TAIL LIGHT DETECTORS.

Harding Specialties Co., Inc., 755 Boylston St., Boston.
(Boston.)

TANKS, ACETYLENE GAS.

Prest-O-Lite Company, 226 Speedway, Indianapolis.
(Prest-O-Lite.)

Branches: See Cylinder Cleaning Compound.

TANKS, TIRE INFLATING.

Prest-O-Lite Company, 226 Speedway, Indianapolis.
(Baby Tire Filler, The Emancipator.)

Branches: See Cylinder Cleaning Compound.

TAPE, ASBESTOS.

Johns-Manville Co., H. W., Madison Ave. and 41st St.,
New York City.

THERMOS CASES.

Dover Stamping & Mfg. Co., Cambridge, Mass.

TIRE ACCESSORIES.

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y. (Holders.)
Shawver Co., Springfield, O. (Tools.)

TIRE CASES.

Hopewell Brothers, Newton, Mass. (Hopewell.)
Branch: 1974 Broadway, New York.

TIRE CHAIN GRIPS. (See Chains.)

TIRE PRESERVATIVES AND PROTECTORS.

Northwestern Chemical Co., Marietta, O. (Tire-Lac.)

TIRES—CASINGS AND INNER TUBES.

Braender Rubber & Tire Co., Rutherford, N. J. (Braender.)

Cataract Rubber Co., Wooster, O. (Cataract.)

Branches: Boston, New York, Providence.

Dayton Rubber Mfg. Co., Dayton, O. (Dayton Airless.)

Gaulois Tire Corp., 1926 Broadway, New York. (Gaulois.)

Goodyear Tire & Rubber Co., Madison St., Akron, O. (No-Rim-Cut.)

Branches: In all principal cities.

United States Tire Co., Broadway and 58th St., New York.

(Continental, G & J, Hartford, Morgan & Wright.)

Branches: See Rims—Removable and Detachable.

TIRES—CUSHION.

Cataract Rubber Co., Wooster, O. (Cataract.)

Branches: Boston, New York, Providence.

(Continued on Next Page.)

When Writing to Advertisers, Please Mention The Automobile Journal.



Safeguard your car
from wear in bearings and
gears—by using

TRADE MARK
NON-FLUID OIL
REGISTERED IN
UNITED STATES PATENT OFFICE

This splendid lubricant interposes a strong, oily film between the metal surfaces which prevents their contact. All the wear comes on the lubricant.

NON-FLUID OIL works equally well in cold weather and hot.

NON-FLUID OIL costs less than other lubricants, per mile or per month.

Packed only in orange-colored cans with above trade-mark.

New York & New Jersey Lubricant Co.

165 Broadway, New York.
1430 Michigan Ave., Chicago.

Thousands of Car Owners All Over the World
Are Using Blue Ribbon Goods



Blue Ribbon Metal Polish
Blue Ribbon Nickel Polish
Blue Ribbon Auto Body Gloss
Blue Ribbon Radiator Leak-proof Cement

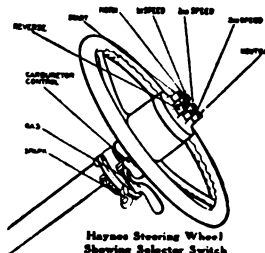
All BLUE RIBBON products strictly high class and fully guaranteed. BLUE RIBBON moves quick for the dealer—works fast for the consumer.

Ask for sample, giving us name of Dealer or Jobber

INTERNATIONAL METAL POLISH COMPANY

Quill and Naomi Streets, Indianapolis, Indiana

W. A. Blackburn, Eastern Distributor, 335 Broadway, Moffat Bldg., New York



Haynes Steering Wheel Showing Selector Switch

Electricity Shifts
the Gears on the

HAYNES

America's First Car

Two "size" and a "four". Roadsters, touring and enclosed body cars.

Catalog covering this season's models upon request.

The Haynes Automobile Company
6 Main Street, Kokomo, Ind.

BUYING AND SELLING MADE EASY

15,000 Trade Interests

READ THE
Accessory and Garage Journal
EACH MONTH

You can secure your monthly audience with all buying and selling heads in all concerns in every branch of the automobile industry through the Accessory and Garage Journal. Such interests must know what you have to offer. All are logical prospective purchasers. They constitute your market and are always looking for lines of merit.

In this magazine the large and small manufacturer has equal opportunity to reach the whole trade and can secure a service equal to that of a trade mailing list and better than can be secured through any other medium.

100 Per Cent. Quantity—100 Per Cent. Quality—Circulation Value.

Every order carries with it a positive guarantee of service stated, and this in any form requested.

Ask how we give concern and product listing under proper classification in Buyers' Guides that have a distribution of more than 1,100,000 copies yearly. This service is free. Our trade mailing list is 100 per cent. active—Do you need it? Details gladly furnished on request.

Next issue March 15th.

Accessory and Garage Journal
TIMES BUILDING, PAWTUCKET, R. I.

(BUYERS' GUIDE—Continued.)

TIRES—SOLID AND COMMERCIAL.

Goodrich Co., B. F., Akron, O. (Goodrich.)

Polack Tyre and Rubber Co., 246 W. 59th St., New York City. (Polack.)

United States Tire Co., Broadway and 58th St., New York
Branches: See Rims—Removable and Detachable.

TOPS AND ATTACHMENTS.

Springfield Metal Body Co., 20 Medford Ave., Springfield, Mass.

TROUBLE FINDERS.

Hopewell Brothers, Newton, Mass. (Vibrator.)
Branch: 1974 Broadway, New York.

TRUCKS AND TRACTORS—(See Cars, Commercial.)

TRUNK RACKS.

Connecticut Steel & Wire Co., Hartford, Conn.

TUBING, GAS.

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

VALVE LIFTERS.

Winsor Manufacturing Co., Providence, R. I.

VARNISHES, ETC.

Valentine & Co., 456 Fourth Ave., New York City; 343 S. Dearborn St., Chicago; 74 Pearl St., Boston.

VENTILATORS.

Wattles, C. B., 441 Butler Exchange, Providence, R. I. (Excelsior Adjustable.)

VOLTMETERS—(See Ammeters.)

VULCANIZERS.

Vanderpool Co., Springfield, O.
Williams Foundry & Machine Co., Akron, O.

WELDING OUTFITS.

Prest-O-Lite Company, 226 Speedway, Indianapolis. (Prest-O-Welder.)
Branches: See Cylinder Cleaning Compound.

WRENCHES AND COMBINATION OUTFITS.

Coes Wrench Co., Worcester, Mass.
Cutter, George A., Taunton, Mass.

When Writing to Advertisers, Please Mention The Automobile Journal.

Unity of Interest

The owners, the board of directors and the executive officers of the Pierce-Arrow Motor Car Company are one and the same group of men.

This means that the

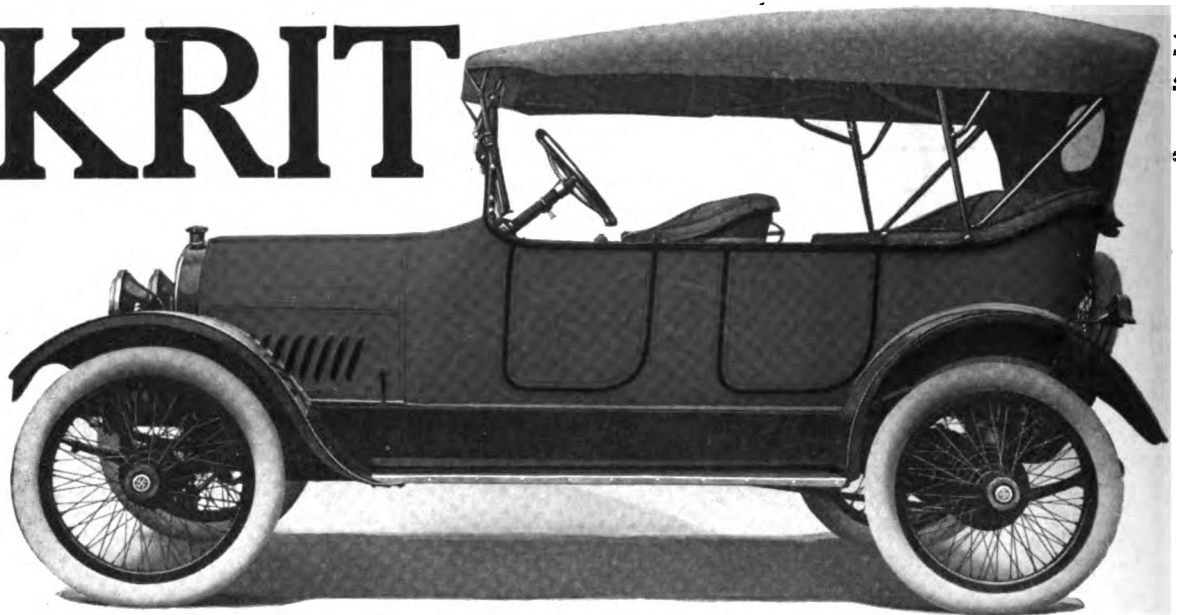
PIERCE-ARROW

organization is one of united individuality, hampered by no outside interference or syndicated control. It means that the Pierce-Arrow directors are free to utilize their full resources of capital, brains and energy to the attainment of their ideal—the successful building and marketing of the best possible motor trucks and pleasure cars.

Every individual directly interested in Pierce-Arrow financial success is a working unit in the Pierce-Arrow organization.

The Pierce-Arrow Motor Car Company of Buffalo, N. Y.

KRIT



This is the Krit Special Touring Car, equipped with electric starter, 5 demountable wire wheels, Golde patent one-man top and seat covers. Complete, it sells for \$1150. Color, Napier green. No other car in the world near the price with so many new features.

A Few Thoughts to Guide You in Choosing Your Car

FALSE PRIDE USED TO PLAY a big part in the buying of a motor car. Price alone too often determined the selection. Folks wanted to be known as the owner of this car or that one because it cost a certain amount of money.

TODAY IT IS VALUE that guides the motorist. He looks for certain modern features in design, in appearance, in comfort, in appointments—and casts his verdict in favor of the car that possesses these and sells at the lowest possible price.

THE OWNER OF A 1914 KRIT GETS just as much motoring satisfaction and pleasure as the owner of a \$2000 or \$3500 automobile secures from his car. The KRIT sells for \$950. In appearance and mechanism it embodies accepted features to be found in the

highest priced cars—beautiful streamline body, tapered bonnet, rounded radiator, graceful fenders, electric lights, electric horn, electric starter, if you wish. It is complete to the last detail in the newest conveniences.

NOR IS KRIT ECONOMY confined only to the initial cost. For the new Krit is light in weight, and well balanced: thus, saving in gasoline and oil, and sparing on tires. ("The Text Book of Motor Car Economy" tells more—ask for it.)

SEE THE NEW KRIT AT the Boston Automobile Show. Observe its striking appearance. Examine its mechanism—evidence of clean engineering. Then you will understand why this car is meeting with popular acclaim everywhere—why it is declared to be two years ahead of its field.

KRIT MOTOR CAR COMPANY, DETROIT

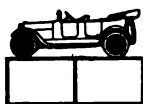
5 passenger touring
or roadster with
complete equipment
\$950.

F. A. Dutton Motor Co.,
Whitten Motor Vehicle Co.,
Peck & Lines Co.,

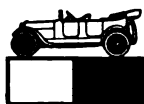
Boston
Providence
Bridgeport

5 passenger touring
or roadster with
electric starter
and generator
\$1050.

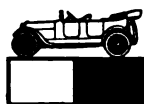
Only 1 oil in 9 is correct for *your* car



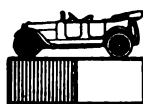
Quality low
Body too thin
for your motor



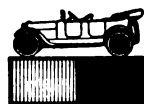
Quality low
Body too thick
for your motor



Quality low
Body correct
for your motor



Quality medium
Body too thin
for your motor



Quality medium
Body too thick
for your motor

That is putting it roughly.

There are two vital factors in automobile motor lubrication. One is the oil's *quality*. The other is the fitness of the oil's *body* for your type of motor.

There are many variations in the *body* of oils. *Only one* is correct for *your* motor.

There are also many variations in *quality*. But, under the heat of service in your motor, only one *quality* will show maximum lubricating efficiency.

What if your oil is below the highest *quality* or incorrect in *body*? Loss of power or undue friction, or both are bound to result. Repair bills follow. Consumption of gasoline and oils mount up.

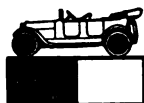
You may "want" correct lubrication. But you will seldom get it by chance. *It is now generally known that oil of correct body for your car can be determined only by detailed motor analysis—backed by scientific lubricating experience.*

The various grades of Gargoyle Mobiloils, purified to remove free carbon, are:

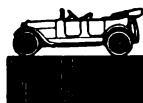
Gargoyle Mobiloil "A"
Gargoyle Mobiloil "B"
Gargoyle Mobiloil "E"
Gargoyle Mobiloil "Arctic"



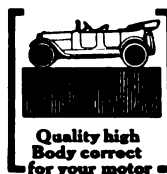
Quality medium
Body correct
for your motor



Quality high
Body too thin
for your motor



Quality high
Body too thick
for your motor



Quality high
Body correct
for your motor

As a fundamental step in producing Gargoyle Mobiloils we analyzed the motors of every make of automobile.

Keeping before us the special requirements of gasoline engine lubrication we manufactured the several grades of Gargoyle Mobiloils from selected crude stocks.

In our lubricating chart, which will be sent any motorist on request, we specify the correct grade for each make of car.

Make note of the grade of Gargoyle Mobiloil specified for your car. Make sure that you secure it—buying preferably in the original barrels, half-barrels and sealed five-gallon and one-gallon cans, marked with the red Gargoyle.

On request we will mail a pamphlet on the Lubrication of Automobile Engines. It describes in detail the common engine troubles and gives their causes and remedies.

They can be secured from all reliable garages, automobile supply houses, hardware stores, and others who supply lubricants.

For information, kindly address any inquiry to our nearest office.



Mobiloils

A grade for each type of motor

VACUUM OIL COMPANY, Rochester, U. S. A.

Specialists in the manufacture of high-grade lubricants for every class of machinery. Obtainable everywhere in the world.

BRANCHES:

DETROIT Ford Bldg. 49 Federal St. 29 Broadway BOSTON NEW YORK CHICAGO Fisher Building PHILADELPHIA 4th & Chestnut Sts. INDIANAPOLIS Indiana Pythian Bldg. MINNEAPOLIS Plymouth Bldg. PITTSBURGH Fulton Bldg.

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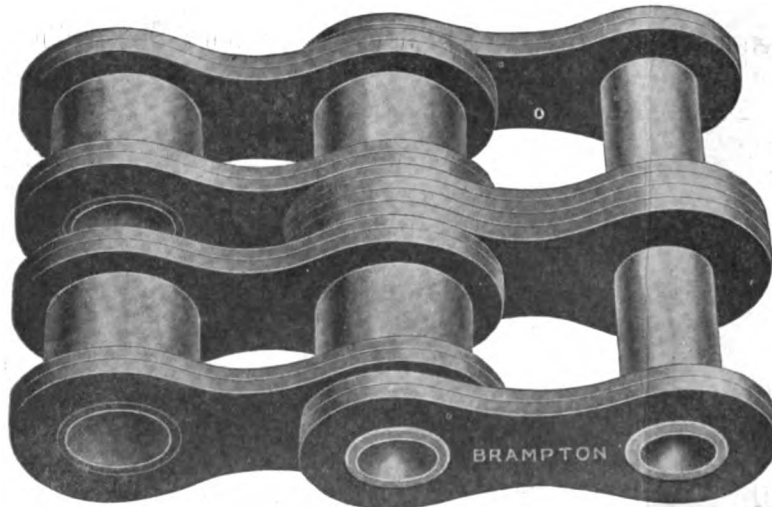
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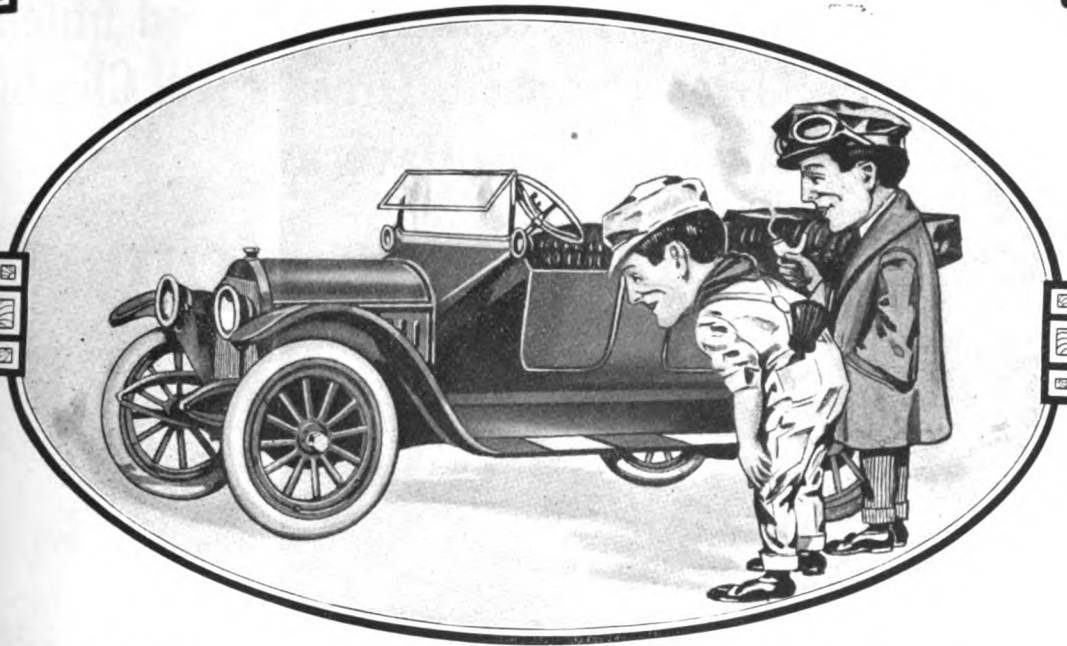
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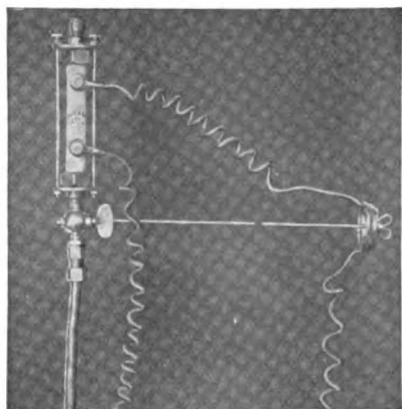
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Immediate Start Greatly Increased Mileage
Greater Power, Greater Speed, Greater Hill Climbing
Ability If You Have a

Duelec Vaporizing Primer and Economizer

PRICE \$7.00



(Patent Applied For)

Attaches to intake manifold, at any location, in any position, operates from switch on dash. Half hour installs it.

OPERATION.

Turn on switch, give engine quarter turn, either by cranking, or by starting mechanism. A drachm of fuel (gasoline, kerosene, denatured alcohol, etc.,) is drawn from main feed line, enters heating chamber, is vaporized, inhaled by cylinder. The first spark explodes this HOT, FUMING, VAPORIZED charge. **YOU'RE OFF.**

The economizer begins operating as the engine speeds up. Feeding HOT air, resulting in great reduction of fuel consumption, vastly increased power and speed.

ADVANTAGES OF DUELEC.

No extra fount of gasoline, or risky mixtures required.

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No unnecessary, expensive spinning by self-starters.

No complicated mechanism. Works automatically.

SUPPLIES HOT, FUMING, VAPORIZED FUEL, for starting, and HOT air through economizer.

FORD OWNERS.

DUELEC operates from **MAGNETO**. Uses only 14 amperes. We will refund price, if it does not prove superior to any device to promote easy starting, and increase power with decrease of fuel consumption.

MOTORISTS. Demand **DUELEC** of your dealer, or we will send upon receipt of price, all fittings included. Great satisfaction guaranteed. 6, 8, or 12-volt battery supplies current.

DEALERS. **DUELEC'S** all round superiority, ease of installing, universal adaptation, and low price, makes it a **BEST SELLER**.

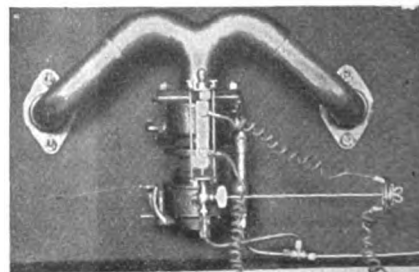
Starter, Engine, Cyclecar and Auto Manufacturers.

Send for **DUELEC**. We will submit one for trial and comparison.

Have your engineer test and compare with anything on the market.

Place your order accordingly. Patents allowed and pending.

Make remittance to order of U. S. Traub.



(Patent Applied For)

Duelec Vaporizing Primer and Economizer

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THE GREAT RIGHT WAY

TO STOP RADIATOR LEAKS.

Pour it in ~ now.
Finds the leak and
fixes it in 15
minutes.

SE-MENT-OL



Carry it in your car. It is always ready for use. No removing of radiator. No searching for trouble with torch and solder. SE-MENT-OL dissolves in the water. In passing thru the leak the cool air congeals it into a cement that effectually closes the cavity. Drain and refill radiator with fresh water.

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Wrenches Are Made Right, Stay Right,
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Ease of Handling Without Fear of Slipping or Bruis-
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Bosch Spark Plugs

eliminate short circuits, breakage by accidental blow or heat and compression leakage, which are common faults often found in other spark plugs but never in Bosch Plugs.

Bosch Plugs are designed to uphold the reputation of the name they bear—they must be good.

Even the perfect Bosch Magneto cannot overcome the loss in efficiency resulting from the use of improperly designed and poorly constructed plugs. Don't use them—use Bosch Plugs.

Insist on Bosch Plugs and you can equal the spark plug efficiency of such high grade cars as the Peerless, Pierce-Arrow, Hudson, Mercer, Garford, Speedwell, Jeffery, Velie, Fiat, Marion, Case, Stutz, Moline-Knight, Lozier, etc.,—which regularly are Bosch-Plug-Equipt.

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Be Satisfied

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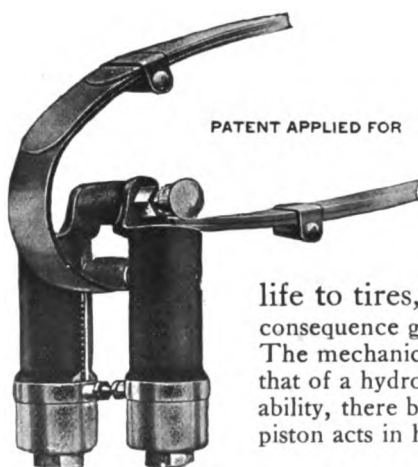
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J. H. S. SHOCK ABSORBERS



are a revelation as well as a revolution in spring suspension.

Their sensitiveness of action **AUTOMATICALLY** takes up and destroys jars and jolts, either heavy or light, and to the occupant of a car it seems like riding on air—fairly floating through space.

Vibration is eliminated, thus giving long life to tires, motor, transmission and other components. In consequence greater speed is possible, as the car does not tend to skid or roll. The mechanical principle of the J. H. S. Shock Absorber is as scientific as that of a hydro-carbon engine. A cylinder and piston are used to insure durability, there being no fragile parts to wear or easily get out of order. The piston acts in harmony with coiled springs which destroy all shocks.

PRICE—\$15.00 AND \$25.00 A PAIR

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GUARANTEE**

SAGER EQUALIZING SPRINGS

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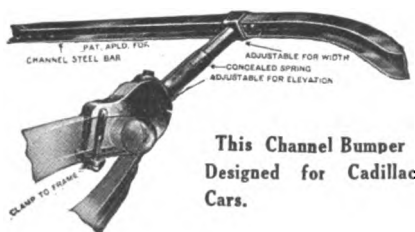
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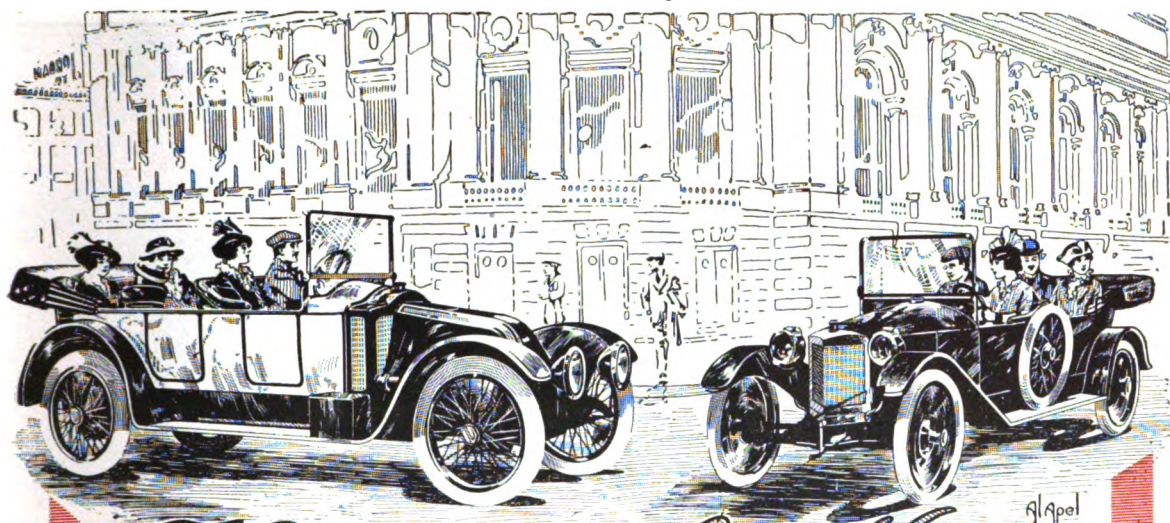
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Keeton Car-Nation

Two Cars That Command Your Attention

The New Keeton Six is not ordinary in any sense of the word.

Distinction is written all over it.

The Keeton Six is a car that commands instant attention in any company—that stands out from the rest—a pleasing, powerful exponent of “class.”

In Keeton Sixes you secure a “foreign” car in all the essentials—as it ranks with the finest products of Europe in design, construction and finish, yet—its price is only about one-half that of an European car.

The mechanical features of the Keeton are of the highest order, based on sound engineering principles.

Keeton Specifications and Equipment

First, don't overlook the length—wheelbase of 136 inches—seats for seven and room for more—then the motor, six cylinders, 48 horsepower, very silent, most powerful.

Four speeds forward transmission, improved cooling system with radiator back of the hood instead of in front.

Electric starting and lighting, five interchangeable wire wheels, 4½-inch tires, power tire pump.

All these, together with the regular accessories, make the Keeton appeal to those who like distinction, combined with comfort.

Price F. O. B. Detroit, Keeton seven-passenger, \$3,250. Two-passenger body, if desired at same price, \$3,250.

The Car-Nation is Standard in every way and “The leader of the small car class.”

It has all the good qualities in style and performance of the high priced cars—yet has light weight and low initial and upkeep costs.

See that “V” shaped radiator, notice the strong wire wheels, also the streamline body—there is “class” enough for the most exacting.

It has “American snap” combined with a foreign appearance.

As a Car-Nation dealer you could fill your territory with “Car-Nations”—it appeals to people in all walks in life.

Car-Nation Roadster, \$495 Touring Car, \$520, As Catalogued

This “big little car” has a unit power plant, with 4-cylinder motor, large valves and bearings—silent and powerful.

The Car-Nation has three speeds forward and reverse, bevel gear drive with one universal joint; Hyatt Roller Bearings in rear axles.

Wire wheels, 30x3-inch, demountable, clincher tires, wheelbase 104 inches, horn, head and tail lamps with set of tools.

A card asking for our “Triple Test” booklet will be promptly answered.

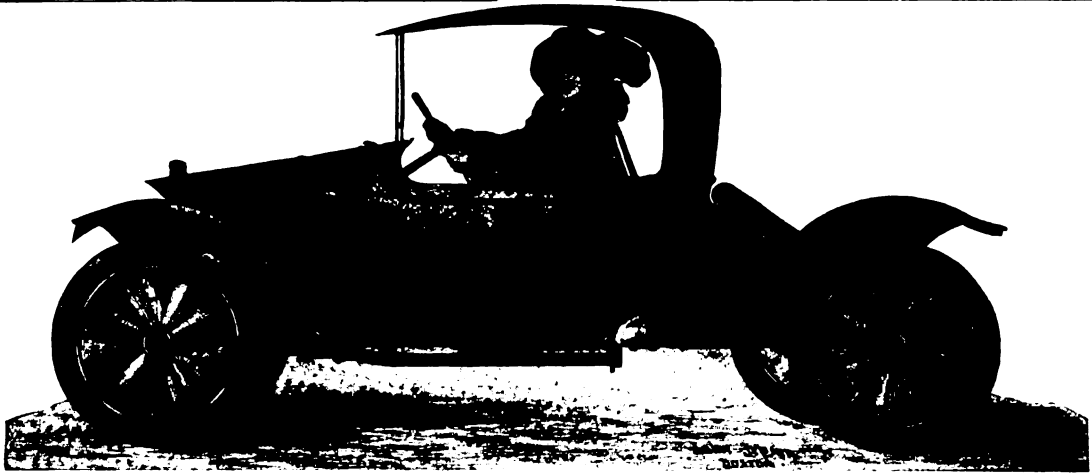
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Detroit, U. S. A.

Boston Distributor—W. B. Doan & Co., 1112 Boylston St., Boston, Mass.

Some Desirable New England territory still open.

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\$485 The Salvador Cyclecar \$485

MOTORCAR VALUE AT CYCLECAR PRICE

PLAZA MODEL BOULEVARD-ROADSTER TYPE

Salvador has arrived a little late, but is moving fast in the streamline of quality.

The advent of The Salvador Cyclecar marks the finish of two years investigation of small car conditions in Europe and America.

The Salvador Car is designed by G. B. Mansur of Boston, who has been identified with manufacturing and selling of automobiles for 12 years. Mr. Mansur's association with The De Dion Bouton Co., of Paris, and his varied experience in American manufacturing, has enabled him to embody the best of European Cyclecar Models in The Salvador Cyclecar, to meet the practical requirements of the American Trade.

His beautiful Luxembourg exterior design in The Plaza Model meets every requirement of quality trade.

***Four Cylinder Water Cooled Engine,
Selective Transmission, Shaft-Driven
Car Is the Answer to Practical Cycle-
car Requirements.***

Salvador Specifications insure the owner the utmost in motoring combined with all the comforts and refinements of a high priced motor car.

NOTICE TO DEALERS

The Salvador Motor Co. plans a limited output for 1914. Absolute deliveries to begin April 10, 1914. Correspondence and bids for territory solicited. The Salvador Motor Co. gives an absolute guarantee covering material and workmanship on the Salvador Cyclecar.

SPECIFICATIONS.

MOTOR—4-cylinder, 4-cycle, 15 horsepower, water cooled, L head 70mmx100mm. Cast enbloc.

LUBRICATION—Self-contained, constant level splash and force system, plunger pump operated by camshaft.

COOLING—Water cooled, thermo-siphon system.

TRANSMISSION—Unit, with motor, crucible steel gears, double heat treated, oil hardened, running on ball bearings, three speeds forward, one reverse.

CLUTCH—Simple cone clutch, three-spring adjustable type.

FRONT AXLE—Tubular, with drop center, conventional type.

REAR AXLE—Bevel gear drive, patented non-skidding differential.

STEERING GEAR—Worm and sector type, with 15" steering wheel.

FRAME—Pressed steel, channel section.

SPRINGS—Front, ¼ elliptic; rear, cantilever.

WHEELS—Wire, 28x3 tires.

WHEEL BASE—100" wheelbase, 42" tread.

CONTROL—Left hand drive, center control.

GASOLINE—Gravity feed tank, located under cowl.

BODY—Luxembourg design: boulevard-roadster type, streamline effect; staggered seats with ample leg room; luxurious upholstery; parcel compartment in the rear.

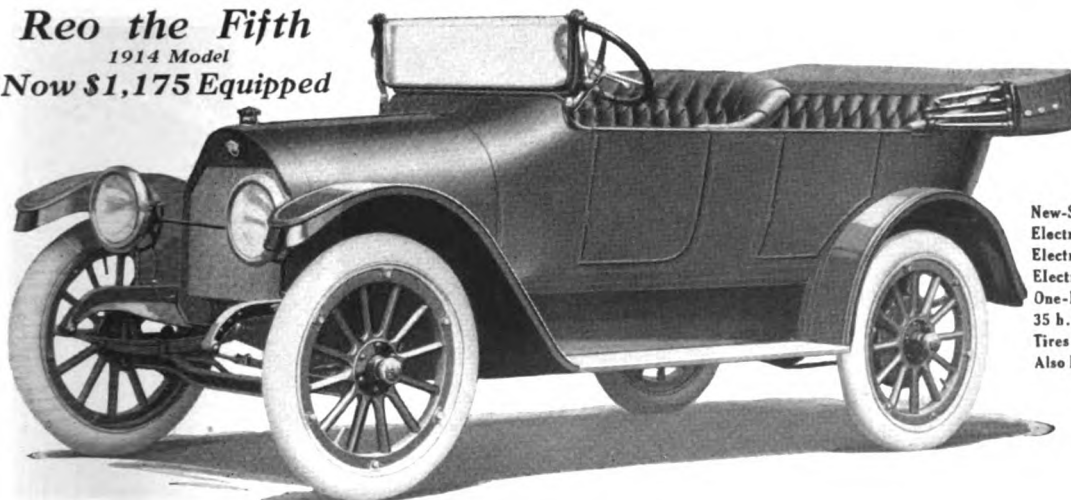
SPEED—45 miles per hour. Plaza model, 65 miles per hour.

FINISH—Deep purple, black trimmings.

THE SALVADOR MOTOR COMPANY Factory, 28 Scotia St. **BOSTON, MASS.**
Gen. Offices, 126 Massachusetts Av.
ADDRESS ALL COMMUNICATIONS TO GENERAL OFFICES

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Reo the Fifth
1914 Model
Now \$1,175 Equipped



New-Style Body
Electric Lights
Electric Starter
Electric Horn
One-Rod Control
35 h. p.
Tires 34 x 4
Also Roadster

All We Can Ever Give

A chassis designed by R. E. Olds, as his final model—as the best he knew—after 25 years of car building.

A car built slowly, in a costly way, as though each car were built for Mr. Olds' own use.

A body of the coming type—a streamline body, believed in Europe to mark the limit in automobile beauty.

Equipment which includes, we think, all that motorists desire.

A price \$220 less than last year—now offering a value which, in all probability, no factory ever can excel.

Thus Reo the Fifth of this year fulfills all our ambitions—even all our dreams—after 27 years in this industry.

Now the Last Step—\$220 Saved

Reo the Fifth came out three years ago. Since then, the sole attention of our experts and designers has been given to its perfection. We have kept test cars running on the road, up to 10,000 miles per car. These cars are then taken apart and inspected. And every betterment which we suggested has been adopted in the chassis.

We have improved the finish and upholstery, the body design and equipment, until the whole car now measures up with the chassis. In none of these respects can we see any hope to do better.

have come from everywhere to inspect this model plant.

But we counted that investment final. Models thereafter were not to be changed. And we knew that sometime—when enormous output had repaid that investment—we could quote on this model a matchless price.

That time has come. This year we reduce our price 16 per cent. Last year's Reo the Fifth, completely equipped, sold for \$1,395. This year's price, with a better body and better equipment, is \$1,175.

Just as Costly

Yet the car is just as costly. save for lower prices on tires and electric starters.

It is still built of steel made to formula—steel analyzed twice. All parts must still pass the same radical

tests. All driving parts, as always, have 50 per cent. over-capacity.

There are 15 roller bearings, 190 drop forgings, a double-heated carburetor. Each car is built slowly and carefully. There are grindings and re-grindings, countless tests and inspections. And test cars are still run for thousands of miles to show up any possible weakness.

Each is built to run for years and years as well as it runs when new. To eliminate troubles, to minimize cost of upkeep. Many thousands of users now can tell you what such precautions mean.

Now Beautiful

And now the car is as handsome as a car can be. With a beautiful streamline body, deep upholstery, fine

finish. With electric starter and electric lights of the best type made. With integral windshield, with all modern equipment.

And with our exclusive one-rod control. No levers in the way of the driver. Gears shifted as easily as moving the spark lever—by moving a rod three inches.

Men who buy their cars to keep want a car like this. They want this finality, this staunchness, this up-to-date-ness. And they want, above all, an honest car, built in this careful, costly way. So many want it that our orders at times run five times our factory output.

We have dealers in a thousand towns. Name of nearest sent with catalog on request.

REO MOTOR CAR COMPANY, Lansing, Mich.
Canadian Factory, St. Catharines, Ont. Canadian Price, \$1,575

(230)

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Two Radiator Shells Per Minute

THE above machine is another one of the numerous Overland cost reducers. This machine turns out 120 whole outside radiator shells per hour.

Small manufacturers, who must by necessity, use small equipment, can only turn out two per hour.

We make two per minute!

There you have the difference—which is one of the many rea-

sons why the Overland costs less than any other similar car in the world.

This machine cost \$12,500.00. It is 18 feet high, weighs 185,000 pounds, and has a capacity of 100 tons, or 200,000 pounds pressure.

It is called a "double toggle press" and is one of the most remarkable economizers used in the automobile business.

The Overland costs 30% less than any other similar car made. For catalogues please address Dept. 52.

The Willys-Overland Company, Toledo, Ohio

Manufacturers of the famous Overland Delivery Wagons, Garford and Willys-Utility Trucks. Full information on request.

\$950

Completely Equipped
f. o. b. Toledo

Electric head, side,
tail and dash lights
Storage battery
35 horsepower motor

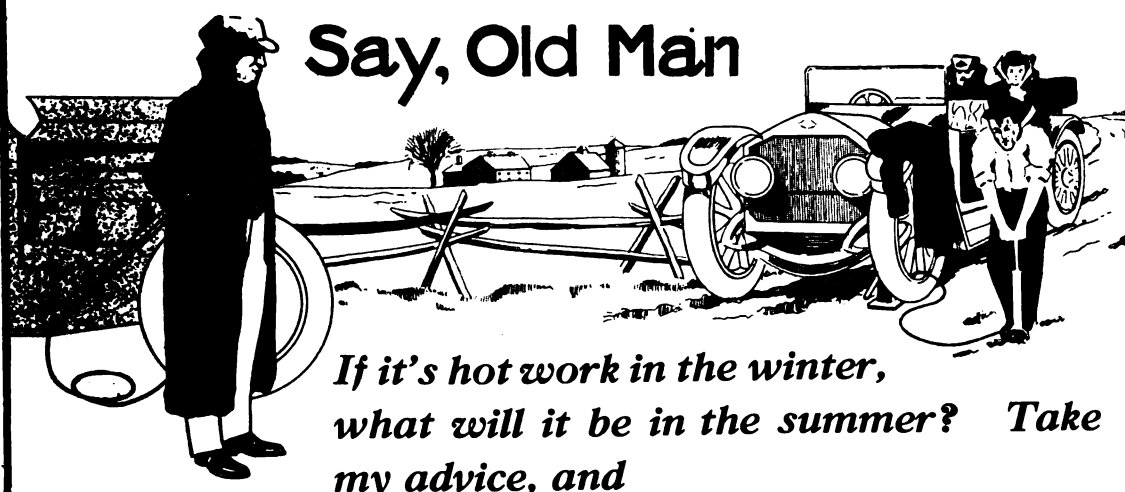
33x4 Q. D. tires
114-inch wheelbase
Mohair top, curtains and boot

Stewart speedometer
Clear-vision windshield
Electric horn

\$1075

With electric starter and generator
f. o. b. Toledo

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BUY A TRI-PHOON AIR PUMP

The Day of the Back Breaking Hand Pump and the Troublesome, Unperfected Power Pump is Past. Today It Is All For Convenience, Pleasure and Practicability. The Price Brings It Within the Reach of Every Car Owner.

Features of the Tri-Phoon Car Pump

Simple—durable—small—light—and can be attached to any make of car. Highest efficiency—can be operated at any speed without injury to working parts. Will deliver at 800 revolutions a minute a steady flow of fresh air equal to the pressure from an air tank charged at 115 pounds to the square inch.

Brackets and fittings are furnished for attaching to all the latest models. Driven by rotary cam. No leather washers used. Lowest in price, complete with fittings and every pump guaranteed to be perfect. Will last a lifetime.



Size 6" Long, 4" High, 4" Wide.

Features of the Tri-Phoon Garage Pump

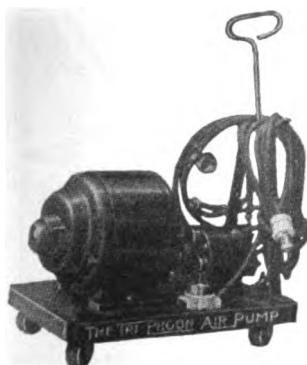
Delivered ready for instant use. Small and compact—takes but little room in garage. No pressure tank as tires are inflated direct from pump. Either direct or alternating current motors furnished. Can be attached to any plug. Mounted on neat truck with handle. All garage pumps are made for heavy service. All are guaranteed.

PRICES FOR CAR AND GARAGE TRI-PHOON PUMPS

3-Cylinder Air Pump, complete with hose and gauge.....	\$20
3-Cylinder Air Pump, complete with hose and gauge and brackets and gears for attaching.....	\$25
3-Cylinder Air Pump, Electric Driven, for Garage Purposes, direct current...	\$75
3-Cylinder Air Pump, Electric Driven, for Garage Purposes, alternating current..	\$80
6-Cylinder Air Pump, Electric Driven, for Garage Purposes, alternating or direct current.....	\$95

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GREEN & SWETT CO., 737 Boylston Street
MANUFACTURERS BOSTON, - - - MASS.



MERCER

AGAIN PROVES Its WONDERFUL ABILITY

FIRST IN GRAND PRIZE SECOND IN VANDERBILT

A Mercer, driven by Edwin Pullen, won the world-famous Grand Prize race at Santa Monica, Cal., Feb. 28, averaging 77.2 miles per hour for the entire distance, 404 miles.

At 300 miles the Mercer's average was slightly over 79 miles per hour—a new road record for the distance. The former Grand Prize record was broken, and a new world's record for 400 miles was established.

The second car to finish was 40 MINUTES behind the Mercer. The fourth car, Mercedes—one of Europe's best—was ONE HOUR behind.

An average of 77.2 miles means that the Mercer was travelling over 100 miles an hour on the straightaways.

In the Vanderbilt Cup Race, Feb. 26, a Mercer driven by Barney Oldfield, was second—only ONE MINUTE behind the Mercedes. The Mercer's average in this race—294 miles—was 75 miles per hour.

Had it not been for an unfortunate puncture on the 32d lap, which cost the Mercer slightly more than a minute, the result doubtless would have been different.

These remarkable victories again stamp the Mercer as being of superior construction. They were not achieved through any chance or luck, but were absolutely the result of merit.

The Mercer is not a one-time winner. For four years it has participated in speed contests of every description, being a consistent winner at all times.

This latest demonstration of Mercer endurance and efficiency should have great significance for the prospective buyer of an automobile.

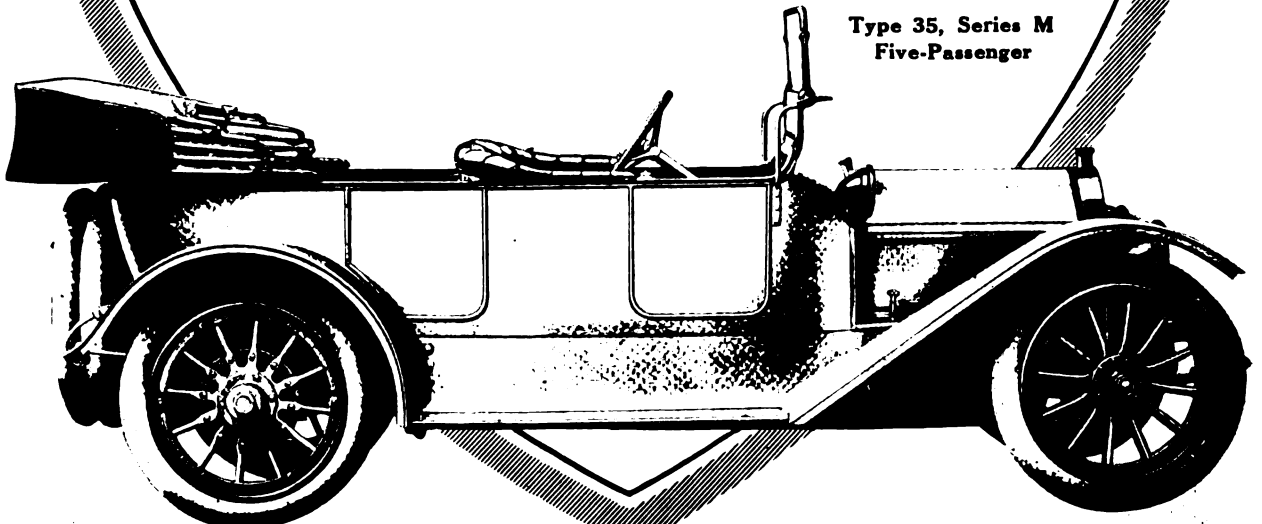
Embodied in all Mercer models are the lessons we have learned from racing. Every car produced is built with the same regard for accuracy that made these victories possible.

Catalogue sent on request. Some desirable territory still open for live dealers.

Mercer Automobile Co.,

1100 Whitehead Road
TRENTON, N. J.

Type 35, Series M
Five-Passenger



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"Used Here, There, Everywhere"

TELEPHONE OR TELEGRAPH ORDERS FILLED
IMMEDIATELY FROM OUR COMPLETE STOCK

MULTIBESTOS

Used on the Majority

OF THE

Highest Priced Cars

ALL SIZES CARRIED IN STOCK

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903 BOYLSTON ST.

BOSTON, MASS.

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Knox Automobile Company.....85	
	OLD DRY BATTERIES renewed,
Lexington-Howard Co., The.....84	about 1c each. Instructions 25c.
	CROWN CHEMICAL CO., Hamil-
	ton, O.

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THE OIL THAT SUITS
AND DOES NOT SOOT.

Carbon in your cylinders means loss of power. Customers report 10,000 to 15,000 miles with no carbon troubles. A good motto: TRY ANYTHING ONCE. EAGLEINE NO-CARBON AUTO OIL is furnished in 1-5-10 gallon, 30 and 50 gallon Steel Drums with faucets for which no extra charge is made.

EAGLE OIL
AND SUPPLY CO.

104 BROAD STREET, BOSTON, MASS.



"The Government insists that Railroads maintain fair and equal rates for all. Why should not manufacturers also have the right to maintain their prices?"

DETROIT, MICH. U.S.A.
October Seventeenth,
1913.

CPT-CB.

Mr. T. J. Daley, Sec'y,
Standard Woven Fabric Co.,
Framingham, Mass.

Dear Sir:-

On account of the satisfactory results obtained from tests of the Multi-bestos Arako Band Lining we have signed, and are enclosing herewith, our contract for 150,000 ft. which is our approximate requirements for one year.

Respectfully

Packard Motor Car Company,
C. F. Hollzger
Purchasing Manager

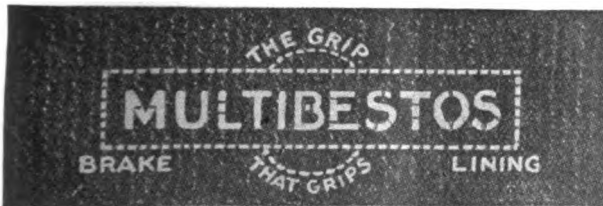
Why

The Chart shows the results of a series of tests conducted for us at the Worcester Polytechnic Institute to determine the relative superiority of Multibestos over five other leading brake linings. Just exactly how much superior Multibestos is in various braking qualifications is shown by the chart.

The figures from 0 to 36 represent units of pressure on the brake pedal. Figures from 0 to 100 represent the braking effect on the car wheel.

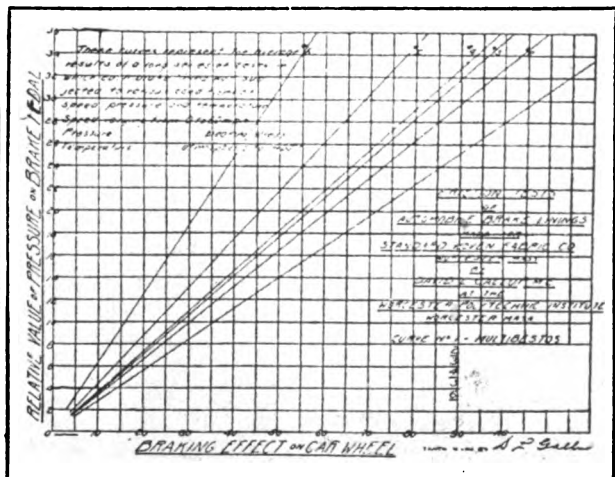
So, taking 16 units pressure, Multibestos shows a braking effect of 57; the other linings from 48 on down to 26 or from 85% down to 45% of the efficiency of Multibestos.

Insure the safety of the cars you sell by seeing that they are Multibestos equipped.



The Standard Woven Fabric Co.
FRAMINGHAM, MASS.

New York, 276 Canal St., C. D. Schmidt. Boston, Mass., 903
Boylston St. Philadelphia, Pa., 1427 Vine St. Chicago,
Ill., 1430 Michigan Blvd., F. E. Sparks. San Francisco, Cal.,
Cor. First and Howard Sts., Fred Ward & Son, Inc.



When Writing to Advertisers, Please Mention The Automobile Journal.



Immediate Deliveries

Mr. Dealer! Perhaps you are one of the hundreds of dealers who visited and admired the Vulcan display at the big Auto Shows this winter. Possibly you said :

"This is a splendid car. Your price of \$750 is right! It is the lowest price at which a man's size car can be made and made right. It is a car that will appeal to my customers—but can you make deliveries? If you can, it is the car I want to handle."

Now, Mr. Dealer—we want to set your mind at rest on the delivery point. **We are making car-load shipments daily.** We can and will fill any reasonable demand you make on us for this car. **And that goes.**

Two years of building and planning; two years of installing special machinery and making special tools were required to enable us to bring "The Vulcan 27" to its present high state of efficiency.

Quantity Production—is absolutely necessary in order to produce this car at the minimum of labor cost and at the same time to maintain the highest degree of perfection. This is the **only way** that the cost of production can be reduced to a point where it is possible to furnish this high grade car at a popular price.

Not an Assembled Car—The Vulcan is not an "Assembled Car." The building of the chassis complete (including axles, transmission, steering gear, clutch, etc.) and every part that enters into these various units is done in our own shops. We even build our own bodies. Our castings are



The Vulcan Mfg. Co.
Painesville, - Ohio

When Writing to Advertisers, Please Mention The Automobile Journal.

made in our own foundry. The sheet-metal work (for bodies, hoods and fenders) is done in our own shops by the most modern machinery, designed for economical production.

The "Vulcan" is so thoroughly standardized, every part so accurately made to gauge, that each part in one car will fit into every other car that we produce.

Throughout the entire chassis the most complete harmony is maintained. The result is that each little part in the "Vulcan" can be depended upon to perform its function in the finished car. Every part is as perfect as every other part. We realized that a single imperfect nut or screw would prevent basic harmony. That's why you'll find no files or reamers in the Vulcan assembling room. Everything slips into place with exact fit.

Rigid Inspection—No car leaves our factory until every individual part has demonstrated that it is perfect. It must be accurate to a fraction of one-thousandth part of an inch.

Quick Deliveries—We are in a position to meet and take care of a big consumer's demand for the "Vulcan 27" Speedster. Let us emphasize the fact that our ability to make immediate and continuous shipments means profit for you and satisfaction for your customers.

Greatest Value—Mr. Dealer, here are further facts that you cannot afford to overlook. When you deliver a "Vulcan 27" to a purchaser you are giving him 25% more real value for the money. Every buyer of a "Vulcan" is a "Booster" for the dealer who sold it to him.

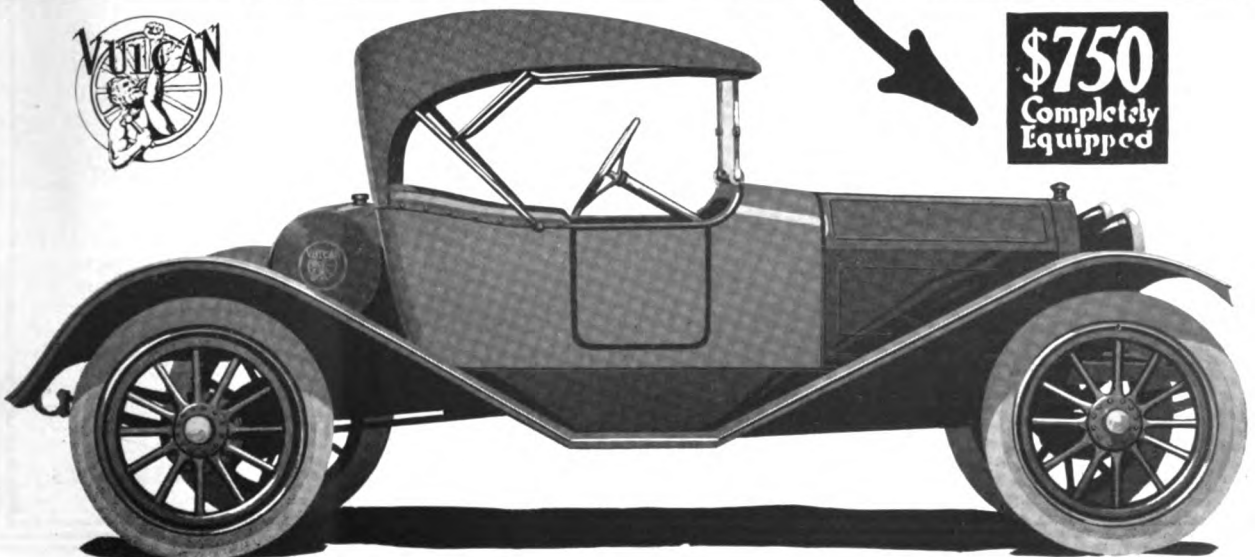
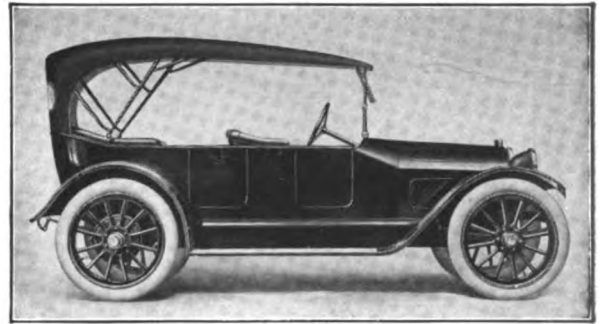
For Live Dealers—We want a few more live-wire dealers to sell—not merely handle—the "Vulcan," as we have taken steps that will enable us to turn out a great many more of these cars this year than we anticipated.

We are only going to take on a few more dealers, as it is not a part of our policy to contract to deliver more cars than we can produce. Don't lose any time in getting our proposition. Write or wire today.

The Vulcan Platform

27 Horse Power.
3 $\frac{3}{8}$ " Bore, 5" Stroke.
Unit Power Plant, 3-point suspension.
105" Wheelbase Speedster.
115" Wheelbase Touring Car.
32x3 $\frac{1}{2}$ " Tires all round.
3-Speed Sliding Gear Transmission, chrome nickel steel gears.
5-Pinion Bevel Gear Differential.

Left Side Drive, Center Control.
"Streamline" Bodies.
Electric Lights.
Full Equipment, consisting of Top and Slip Cover, Windshield, Speedometer, Electric Lights and Horn, Tools, Jack and Q. D. Rims.

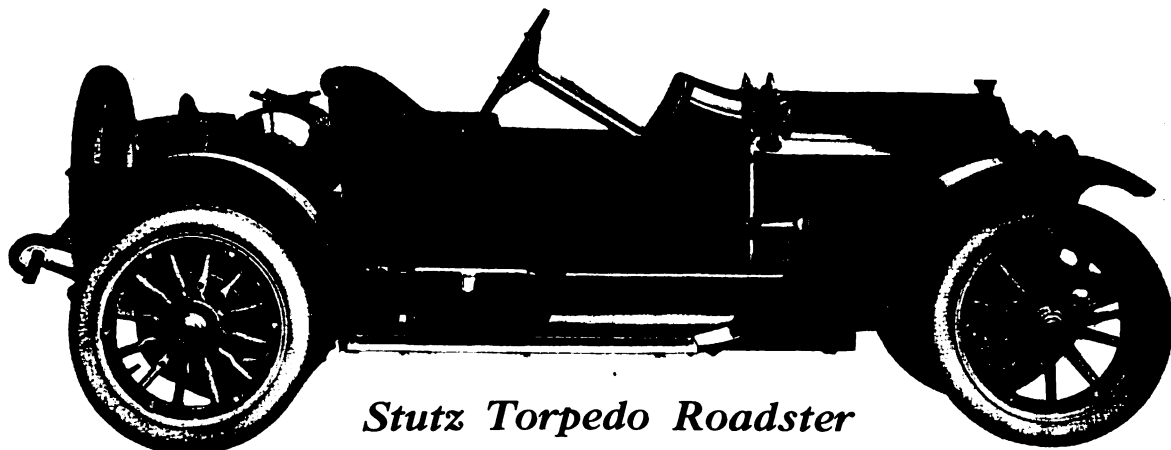


\$750
Completely
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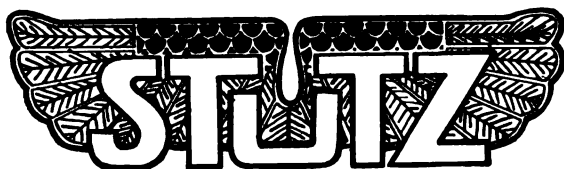
*Holds the World's Road Race Record
for 301-450 class—75.03 miles per
hour, former record 74.42*



Stutz Torpedo Roadster

Four cylinder—\$2000

Six cylinder—\$2250



Suit yourself about which model, but be sure it's a STUTZ

Stutz cars are sold to the "motor wise" who have their own ideas about which model to buy—a "four" or a "six."

We build both, and assume that you know what you want. We do not attempt to tell you which car is better *in theory*.

Stutz Fours and Sixes are built on identically the same chassis. The motors develop exactly the same horsepower. So, if you really appreciate high grade construction in a motor car, take your pick—a Stutz Four or Six?

The extra cost of a Stutz Six is only the extra cost of six-cylinder motor.

A Trustworthy Car

In performance, on track or boulevard, it is impossible to get a more trustworthy car than the "Sturdy Stutz."

Thousands of Stutz owners are finding that out. Power—Speed—Endurance—Freedom from mechanical trouble—these qualities make the Stutz the *Champion Road Car*.

Dealer's "Best Bet"

Last season we were unable to make contracts with any more dealers. We had just enough cars for those who had been with us from the first.

We are preparing to enlarge our field of operations and have a money-making proposition, based on merit, for the right dealers.

Write today for our proposition and Booklet No. A-5, Series E. Don't wait.

Stutz Motor Car Company

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Indianapolis

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THE AUTOMOBILE JOURNAL

VOL. XXXVII, No. 3

MARCH 10, 1914

Price, \$1.00 the Year

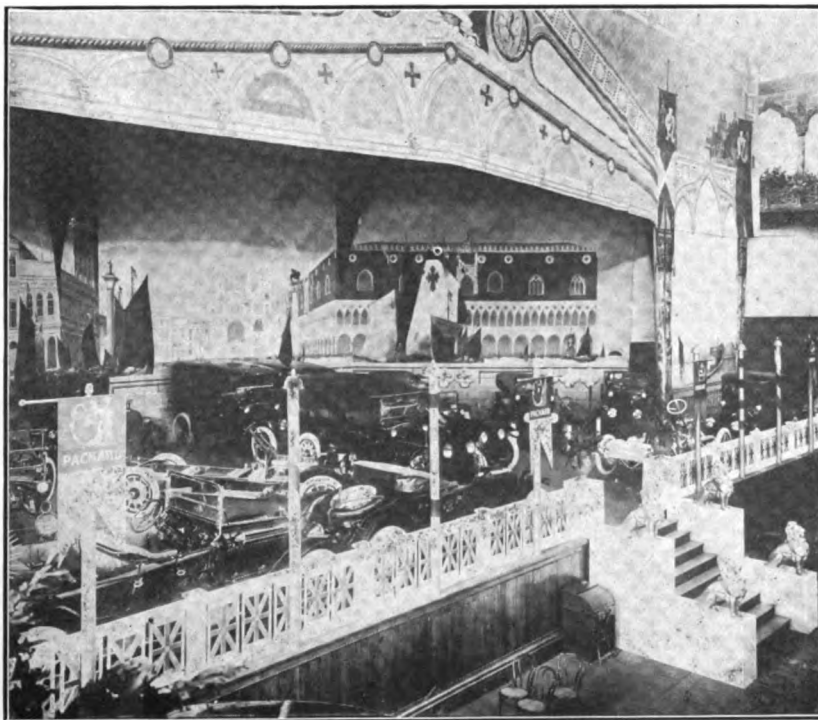
BOSTON SHOW AGAIN SETS NEW RECORDS.

Crowds in Attendance, Increase in Sales and Number of Agency Contracts Demonstrate Importance of New England Market—Artistic Decorative Treatment.

ALL attendance records for the Boston automobile show were exceeded early Friday morning. Over 240,000 people had visited the big display when the doors were closed Thursday evening. The previous record was made in 1913, when 245,000 admission tickets were counted by the attendants at the doors. Of course, these figures do not include the employees of the various exhibitors admitted on season passes, but represent those persons actually interested in the vehicles and accessories on exhibition.

And it was particularly noticeable this year that the crowds began to appear during the early morning hours, many people being in line each day waiting for the doors to open.

While it is still too early to make a definite statement regarding the sales consummated during the week, it seems safe to predict that a new record will be created here, as well. The Boston automobile show always has been the retail selling exhibition of the year, and in 1913 it was estimated that the total sales amounted to over \$2,000,000.



Indicating the Remarkable Beauty of the Decorative Scheme for the Twelfth Annual Boston Automobile Show—The Main Feature of the Venetian Setting on the Stage of Grand Hall.



Partial View of Accessory Division in Balcony of Exhibition Hall, Showing One of the Side Aisles.

It has been true of every automobile show held this year, that surprises have been experienced by the exhibitors, and in this respect the Boston show is no exception. While the retail sales have more than held their own, according to statements made by the exhibitors throughout the week, there has been by far a larger number of dealer's contracts signed than ever before at a display held in this city.

Still the Biggest Show.

This is a particularly surprising situation, since the Boston show is a dealer's proposition, conducted by the dealers of Boston, and while they have every assistance from the manufacturers, officials of the company have not hitherto regarded it as an especially fruitful field for securing new agencies. These usually are signed up, insofar as the East is concerned, at the New York show. Of course, it always has been true that dealer's contracts have been closed during Boston show week, but the number this year was such as to occasion much comment among factory men present.

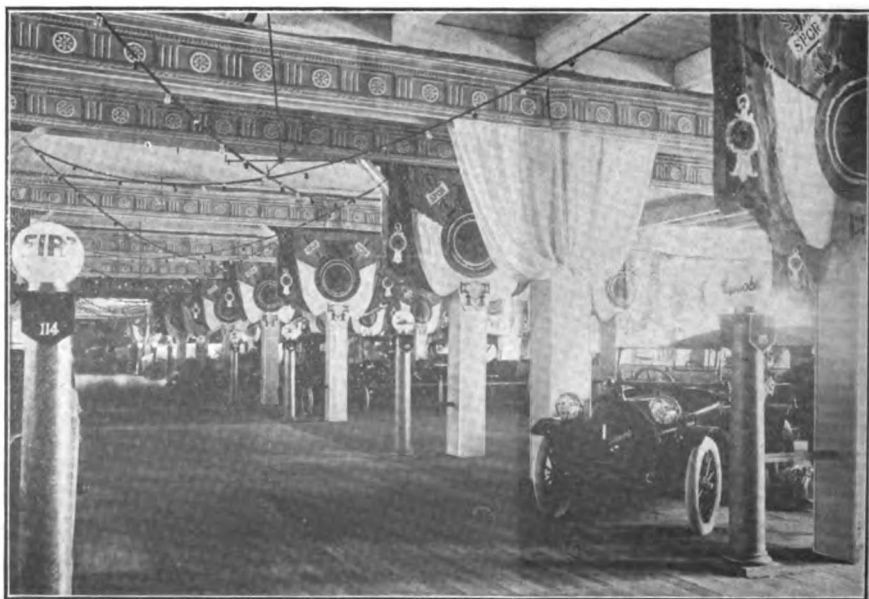
The Boston automobile show still retains its position as the largest in the world. A careful count of the machines on view indicates a total of 106 different makes—82 gasoline automobiles, eight electric, one steam and 14 cycle-cars—and 318 complete cars and chassis. Of these, 25 makes were shown in Grand hall, 35 in Exhibition hall, 43 in the basement and three in the balcony. Last year there were 108 different makes and

323 cars and chassis, but it will be understood that several concerns making display in 1913 are no longer producing cars, either through withdrawal from the industry or because of consolidations with other companies.

Comparison may be made with the 1914 shows in New York and Chicago. In the former city there were 78 different makes of machines and 318 complete ve-

hicles and chassis, so that it will be seen that while there was a lesser number of makes, the average of cars displayed by each was such as to bring the total exhibits to same figure shown in Boston. In Chicago there were 86 different makes on display and a total of 302 cars and chassis.

In order to make comparison with foreign shows, it is necessary to add the truck exhibitors, since trucks and pleasure cars are shown together in Paris and London. At present there are 35 different makes of trucks and business wagons scheduled for the second week of the Boston show, which, added to the total of 106 for the pleasure car section, makes a grand total of 141. Paris had 132 and London 126. It is expected that the list of truck exhibitors will be increased materially during the last few days preceding the opening of the display. Boston has



Looking Down the Main Aisle in Exhibition Hall, Where Cars Were Displayed in an Old Roman Setting.

every right to the title, "Greatest Automobile Show on Earth".

It has seemed each year that Manager Chester I. Campbell and his brother, Architect Ernest W. Campbell, had exhausted every opportunity to produce a more pleasing spectacle, yet the decorative scheme this year was even grander and more artistic than ever before. No part of the building was neglected. Even in the basement, where it is conceded to be a difficult matter to devise satisfactory means for disguising the somewhat unattractive interior, handsome oil paintings covered the side walls and bunting was utilized elsewhere to secure a most pleasing effect.

Upon entering Mechanics' building at Huntington avenue and Exeter street, the corridor leading to Exhibition hall was found to be converted into a triumphal archway, reminiscent of the old Roman period, flanked on either side by pilasters and marbleized work to create the impression of stone walls supporting the arches. This treatment was continued within Exposition hall itself, the effect being that of a Roman festival.

The wooden posts supporting the upper floors were treated with marbleized board, representing pillars, on top of which were grouped Roman banners in bright colors, each group being sur-



Arrangement of Accessory Booths on Second Floor of Exhibition Hall, and Decorative Scheme Employed.

mounted with the Roman battle shield bearing the letters S. P. Q. R., signifying Senatus Populusque Romanus—the Senate and the Roman people. The light well in the centre of the hall was treated to represent a court yard in a large Roman house, the marbleized front producing the effect of house walls, relieved by bright awnings. The side walls were decorated with paintings, flanked by marbleized work, and flowers were used profusely to relieve the otherwise stately effect of the banners. The exhibition spaces were set off by pillars surmounted by illuminated glass balls, bearing the name of the car.

Venetian Setting in Grand Hall.

It is in Grand hall that the decorator usually seeks to exert his greatest skill, and the effect this year was such as to cause instant appreciation. Photographs failed to do justice to its exceptional beauty, because the camera utterly fails to reproduce the rich colorings employed. It is almost as futile to attempt to describe the impression created.

The scene reproduced was that of Venice as approached from the sea, with St. Mark's and the Ducal Palace near at hand. The oil paintings on the stage and along the side walls, above the balconies, were arranged to present the fronts of houses and to give the impression that the visitor was sailing along the Grand Canal. Apparently, the city was dressed as for a gala occasion, with a liberal use of banners in the brightest of red and gold. Venetian crests and marble lions were so placed as to



General View in Grand Hall, Showing Pleasure Cars Amid Surroundings Depicting the Grand Canal, Venice.



Handsome Treatment of Stairways Leading from Exhibition Hall to Accessory Section on Upper Floor.

increase the illusion, and the exhibition spaces were marked with high poles, such as are utilized in the Grand Canal for mooring gondolas, surmounted by red and gold banners bearing the name of the car. High above all was a mosaic painting, representing the sky, dependent from which hung eight electroliers, each composed of 12 Venetian wrought iron lamps. The effect at night was particularly pleasing.

The Venetian setting was continued in the balconies on Grand hall, of course, but in the balconies and upper rooms over Exhibition hall, paintings, floral decorations and bunting were utilized to transform this section of the display as never before. Mention already has been made of the basement.

Cars were shown in Exhibition hall, Grand hall, the basement, and for the first time, in the balcony of Grand hall. In the basement, also were to be found the largest exhibition of cyclecars yet held in America, a representative display of motorcycles and a number of accessories, supplies and fittings. The main accessory showing was in the balconies, however, as in past years.

Insofar as the cars were concerned, of course the display was the most complete

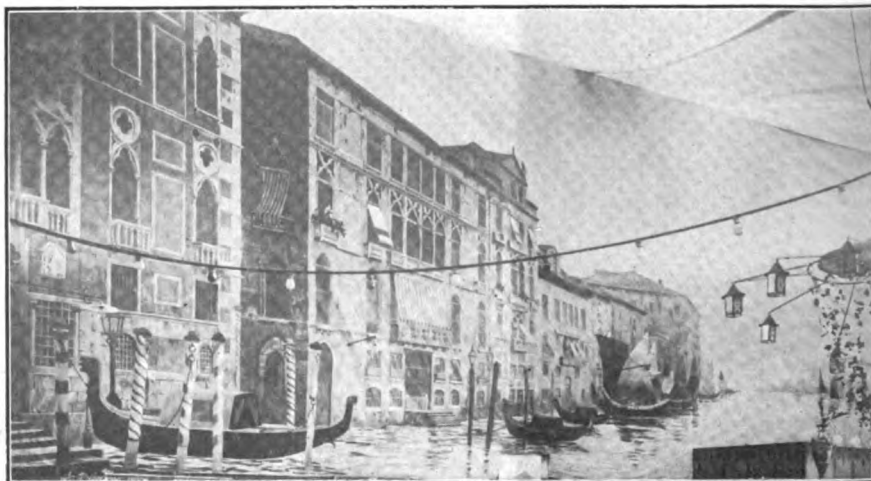
ever held, and while many machines were exhibited at Chicago which were not seen at New York, there were several makes which had not been seen at a show of national prominence during the 1914 season. Among these were the Ford, Inter-State, Knox, Lenox and Moyer gasoline cars; Bailey and Buffalo electrics and Stanley steam. The Renault might be included, although this make was shown in connection with the Importers' Salon in New York.

New Cars on Display.

The Ford was presented in the touring car, runabout and town car, and with none of these has there been any decided change in design or construction. The Inter-State was represented by the model 45, which is the six-cylinder car announced for the 1914 season by the old Inter-State Automobile Company, before the purchase of the concern by the new Inter-State Motor Company. The new car, recently announced by this company, was not completed in time.

Knox cars were shown in four and six-cylinder models, as touring, roadster and enclosed types, the latter being with the natural wood finish, for which this make of machine has been noted in recent years. The Lenox line also comprised four and six-cylinder machines, fitted with touring and roadster bodies, and an entirely new speedster design with pointed radiator and other distinctive features. The Moyer was presented as a six-cylinder touring car and a four-cylinder roadster. The details of all these lines, as well as of the Stanley steam cars, were presented in the last issue of *The Automobile Journal*.

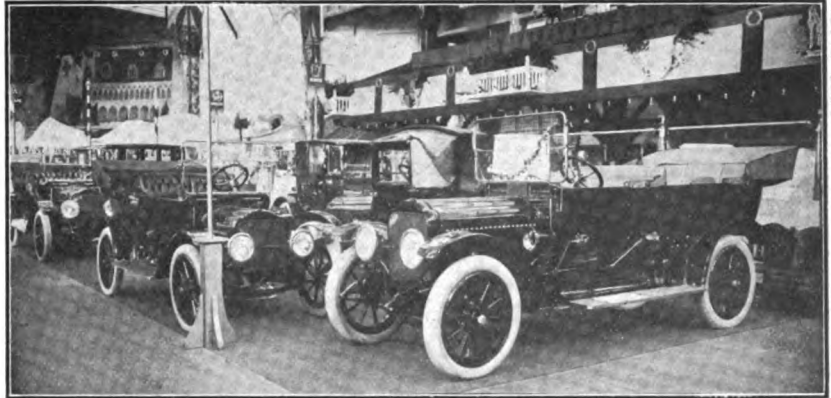
The Bailey electric was displayed in the enclosed type, as well as in the two and four-passenger roadsters. The last named was first seen



A Detail of the Decorative Scheme in Grand Hall—An Extension of the Grand Canal Over the Balcony at the Rear.

at the electric show in New York City last fall, and has occasioned some little interest because of its appearance, which is not unlike that of the four-passenger gasoline machine. The Buffalo electric was shown in two enclosed types, one of which was with bare aluminum body, giving full opportunity to inspect the material before it had been painted.

As forecasted in the last issue, there were several cars seen in Boston for the first time, these being the Allen, Chandler, Car-Nation, Howard, Briscoe, Keeton, Willys-Knight, Saxon, Moline-Knight, King, Herff-Brooks and Lyons-Knight. The new models of



Space Occupied by White Cars, Indicating Attractive Appearance of the Individual Exhibits in Grand Hall.

of horsepower. Several new body designs were shown on other machines, these following so-called conventional lines for the most part, with the exception of that fitted to the KisselKar 4-40. With this there is but one door on either side, entrance to the front being by way of the tonneau, there being a passage way between the individual seats. As has been true in other years, there were a number of handsomely appointed enclosed bodies.

The Accessory Display.

Special reference is made elsewhere to features of design and construction, and also to the cyclecar division of the show, which was a distinctly important factor. Nine makes of motorcycles were shown in the basement, these being the Flying Merkel, Excelsior, Indian, Jefferson, Harley-Davidson, Henderson, Pope, Thor and Yale.

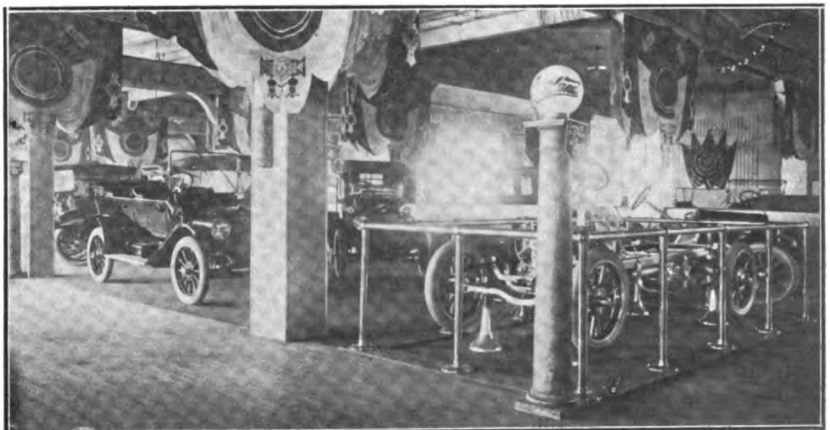
It is somewhat difficult to make comparison between the showing of accessories, supplies and fittings this year and that of previous displays, for the reason that these lines were presented



One of the Individual Accessory Booths: H. W. Johnson-Manville Company, Near Light Well to Exhibition Hall.

cars otherwise well known in Boston included the following: National Six, Jeffery Six, Lozier Four, Packard 4-48, Premier Weidely, Chevrolet Baby Grand and Royal Mail, Maxwell 25-4 and 35-4, Mercer O and M, Pathfinder Leather Stocking, Hudson 6-40, Velie 6-50, Abbott-Detroit Belle Isle, Henderson Six, Marion G, Haynes 27, Maxwell 50-6, Buick B 55, Imperial 44 and Apperson 6-45.

The Packard 4-48 is an entirely new model, announced since the Chicago show, and therefore shown for the first time anywhere. It does not depart greatly from the 2-38, announced previous to the New York show and displayed at that exhibition, except in the matter



Display of Overland Cars Sets Forth in More Detail the Arrangement of Old Roman Banners, Etc., in Exhibition Hall.



Attractive Display of Acco Lubricants and Salesmen in Attendance at A. C. C. Oil Company's Booth.

very largely by local dealers instead of by the manufacturers themselves. Early in the season the Motor & Accessory Manufacturers decided not to issue a sanction for this show, thereby prohibiting its members from making display direct. Efforts were made to have this decision reversed, but without avail.

New Lines Revealed.

Despite this serious handicap, the accessory division of the show was even more representative of the industry than ever before, although individual lines were grouped in the display made by the local dealer or distributor and failed to make the same impression that they would have done had it been possible to follow the custom of past years. The showing of tires was more general than at either the New York or Chicago exhibitions.

Many new lines were revealed; that is, many new lines were displayed for the first time at any automobile show, although practically all of these were more or less well known to motorists

who have followed the New Accessory department in The Automobile Journal. Those who sought to dismiss this section with a cursory examination were surprised to find the extent of the lines allied with the automobile industry, the display including practically everything that could be desired for the comfort and convenience of the motorist, or for the economy of maintenance and operation of the car.

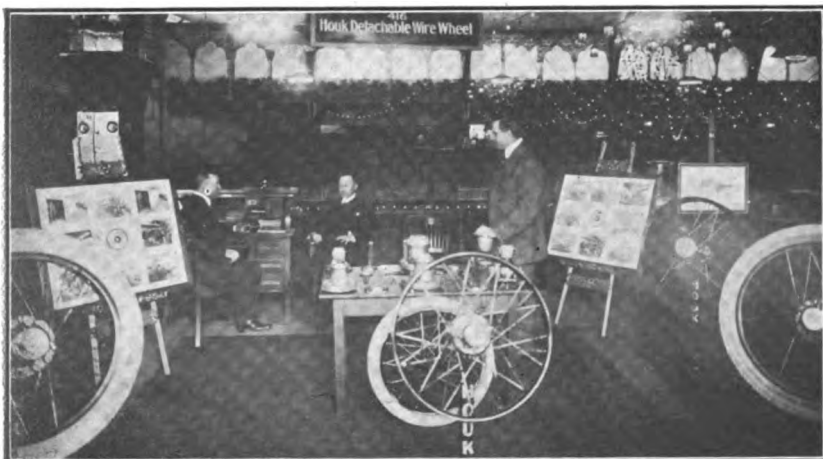
Among the products not seen hitherto were the following: Calnan tire tool, made by James P. Calnan, West Upton, Mass.; Cochran Speednut wrench,



Where Prowodnick Tires Were Shown by Columb Tyres Import Company.

Cochran Pipe Wrench Manufacturing Company, Chicago; Lawrence motor lock, for locking the emergency brake lever, Lawrence Specialty Company, Dorchester, Mass.; Lewis mechanical gearshift, Lewis Manufacturing Company, Philadelphia; Merrimac enclosed door hinges, Merrimac Hinge Company, Merimac, Mass.; Thumlock pipe coupling, Gurnard Manufacturing Company, Beverly, Mass.; Webber carburetor, Webber & Blomquist, Neponset, Mass., and Two-Way valve tool, L. D. Robbins Company, Lynn, Mass.

The 1914 Boston automobile show will go down in the history of the automobile industry as the most complete showing of its products ever made in this country or abroad. It has established



Houk Wire Wheels Were Shown by George W. Houk Company in the Balcony of Grand Hall.

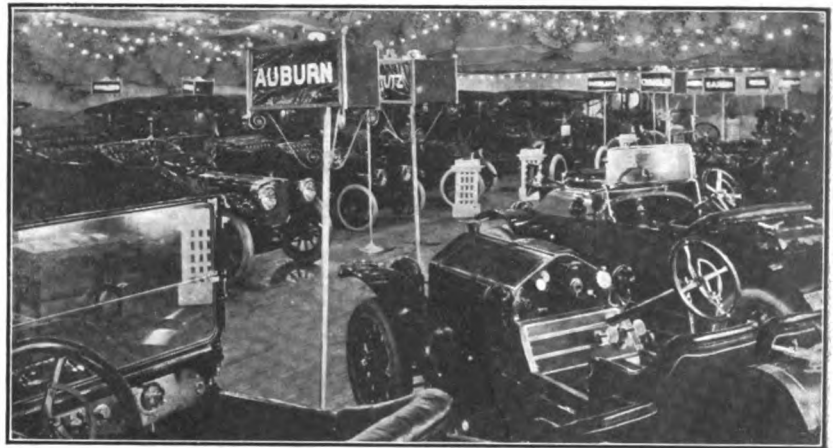
new records in both attendance and sales, and has again demonstrated that New England is the greatest motor vehicle market in the world. It is a fitting climax to the 1914 show season, and manufacturers and dealers will enter the active selling period satisfied that the optimistic view of the situation made public by Boston dealers early in the winter was well founded.

UTICA'S ANNUAL SHOW.

Twenty-Eight Makes of Cars Displayed Amid Surroundings of Green and White.

Twenty-one members of the Utica Automobile Dealers' Association exhibited 28 makes of cars at the annual show in the state armory, Utica, N. Y., March 2-7, under the auspices of the Utica Automobile Club and the management of W. G. Comstock. Some 18 dealers in accessories also were represented. The setting was green and white, and, as indicated by the accompanying illustration, the effect was decidedly pleasing. Those who displayed cars were:

Utica Saxon Motor Company, Saxon; H. W. Skinner Motor Car Company, Packard, Chandler; Daiker Motor Sales Company, Maxwell, Winton; King Motor Agency, King; Chas. H. Childs Company, Jackson; Frank E. Henabray Motor Company, Oakland; I. R. Gardinier, Empire, Pullman; H. D. Crim Automobile Company, Studebaker, Cole; Robert F. Payne, Velle; Beatty-Buick Sales Company, Buick; Utica Motor Car Company, Cadillac; Otis Motor Sales Company, Reo, Ford; Fiscus & Harris, Auburn; John M. Weaver, National, Stutz; Regal Agency, Regal; Schiller & Creswell, Detroit electric; Franklin Motor Car Company, Franklin; Geo. M. Redding, Allen, Haynes; Metz Motor Sales Company, Metz; Stevens-Duryea Company, Stevens-Duryea.



General View in State Armory, Utica, N. Y., During Progress of the Annual Automobile Show.

TAKES OVER DEAN BUSINESS.

Garford Manufacturing Company Is Being Organized for This Purpose.

According to information from Elyria, O., the sale of all property, assets, patents and good will of the Dean Electric Company of that city has been made to A. L. Garford, who is organizing the Garford Manufacturing Company with capital of \$500,000 preferred and \$800,000 common to take over the business. The proposition submitted by Mr. Garford provided for the exchange of preferred stock of the Garford Manufacturing Company for bonds of the Dean Electric Company, which were outstanding, amounting to

\$250,000; all creditors' claims, totalling \$427,000, to be put in the form of notes and assumed by the Garford company to be liquidated over a period of five years.

The officers of the new company are: President, A. L. Garford; vice president and general manager, A. G. Bean; directors, A. L. Garford, president, Cleveland Automatic Machine Company, Cleveland, O.; John Sherwin, president, First National Bank and First Trust & Savings Company, Cleveland; H. H. Johnson, M. B. & H. H. Johnson, Cleveland, attorney; A. G. Bean; A. L. Patrick, certified public accountant, Cleveland; John P. Brophy, vice president and general manager, Cleveland Automatic Machine Company, and E. F. Allen, president, American Lace Company, Elyria.

It is stated that the new company will continue the production of telephones, switchboards

Company, Metz; Stevens-Duryea

and electrical apparatus, and that it will largely increase the automobile accessories department. This includes electric horns, speedometers, lighting generators and motor starters.

MOSLER FACTORY SOLD.

Street Improvements Necessitate Erection of New Plant in Another Location.

Announcement is made from New York City that the factory of A. R. Mosler & Co., Mount Vernon, N. Y., maker of Spit Fire Spark plugs, has been sold to the Bronx Parkway Commission for \$93,000. It is understood that this property will be utilized for an extension of a boulevard to Kensico. It is further stated that two new factories will be erected by the Mosler concern within six months, but the site has not been chosen.

DETAILED REFINEMENTS OF 1914 MODELS.

What the Manufacturer Is Providing in Comfort and Conveniences—Improvements in Mechanical Construction—Factors That Appeal to Prospective Purchasers.

WITH Boston the final word in the 1914 show season, the motor car manufacturer retires in favor of the sales organization. The most critical observer cannot but concede that there is decidedly more value offered the prospective purchaser than formerly, and that tempting inducements are held forth even to the owner of a 1913 model to change for the newer design. And in these days of the perfected automobile, insofar as the mechanical construction is involved, the maker must provide conveniences and comforts not existent in former models if he would appeal to the owner of a modern machine.

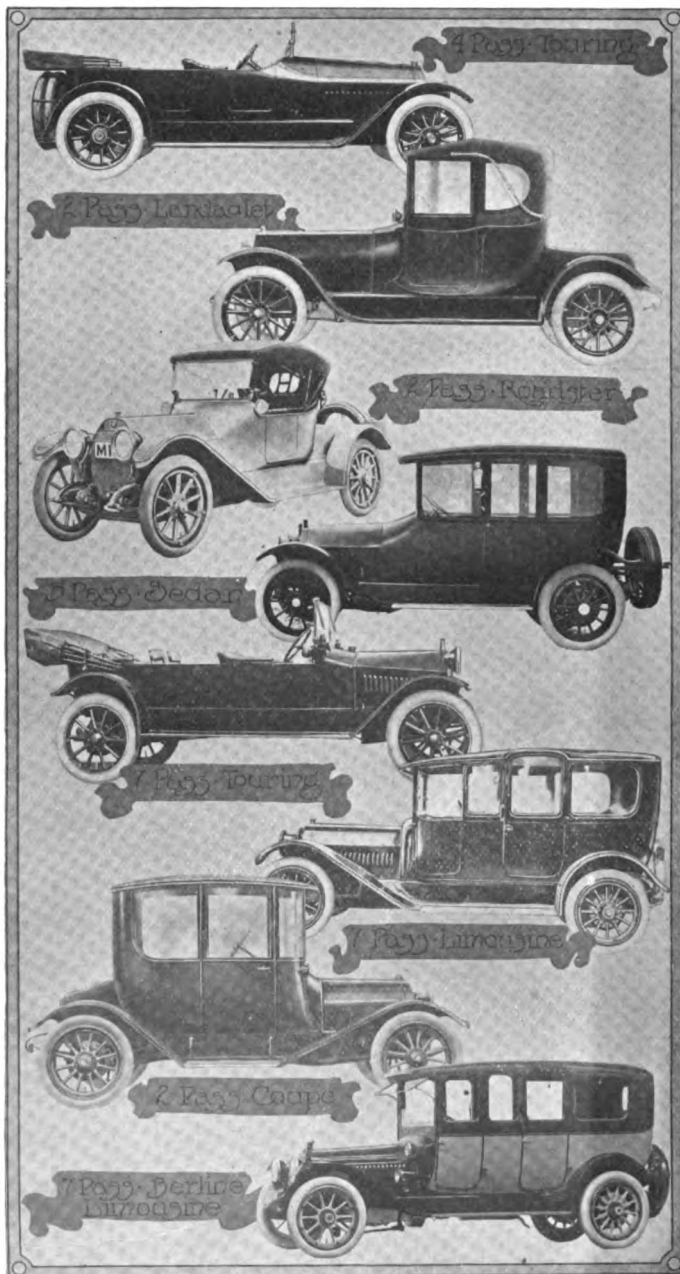
While the conservative owner held that the general adoption of electric lighting and motor starting in 1913 was the last word in equipment, the show season just closed demonstrated that the car manufacturer, body builder and equipment and accessory maker, have again displayed their ingenuity in producing features that appeal to even those not contemplating the purchase of a new model.

To the casual observer it would appear that only small

details have been refined; that the manufacturer has made his product more attractive to the eye.

While this holds true in some respects, those who have followed the development of the automobile industry as exemplified by the annual displays, find a wealth of details which not only contribute to the pleasures of motoring, but eliminate discomforts formerly existing. Viewed from an artistic standpoint, a study of the bodies offered shows that immense strides have been made during the past 12 months. The streamline formation of the car body as a whole, that was just beginning to make itself evident at the shows last season, now has become the rule. Wherever bodies have been redesigned there is a marked tendency toward the long, smooth flowing lines, and in practically every instance it has resulted in much improvement esthetically, while the more practical, but no less important, aspect of comfort has not been overlooked.

A noticeable development in body designs this year is the double-purpose type, which is adapted to be transformed easily from the open



The Streamline Form of Body Is Now Standard Practice Not Only in the Higher Priced Cars and Limousines, but in the Popular Priced Types.

to the enclosed. This tendency predominates mostly in cars of smaller seating capacity, practically all of the development along this line being in the combination of the coupe and roadster or runabout. These combinations appear under different names, such as landaulet-coupe, cabriolet, coupelet, coupe-roadster, landau-roadster, convertible, all-weather, etc.

The large number of coupe types indicates the growing demand for these all-year cars. The majority are constructed somewhat on brougham lines, and the two and three-passenger designs predominate, although instances of larger capacities are noted. With some two-passenger styles provision is made for a third person by using a drop seat. Curved roofs with graceful lines are much favored, and the front glass is usually a divided windshield of the clear vision type. The side and rear panes are generally two each, although instances of three side members are noted. As a general rule, the glasses are very large, following the tendency toward narrow framing and large glass panels. The upholstery is in Bedford cord and grain leather. In several instances, with three-passenger designs, the driver's seat is slightly ahead of the passengers, a commendable arrangement. Provision is also made for the storage of luggage.

That there is a constantly increasing demand for a town car is evidenced by the large number of

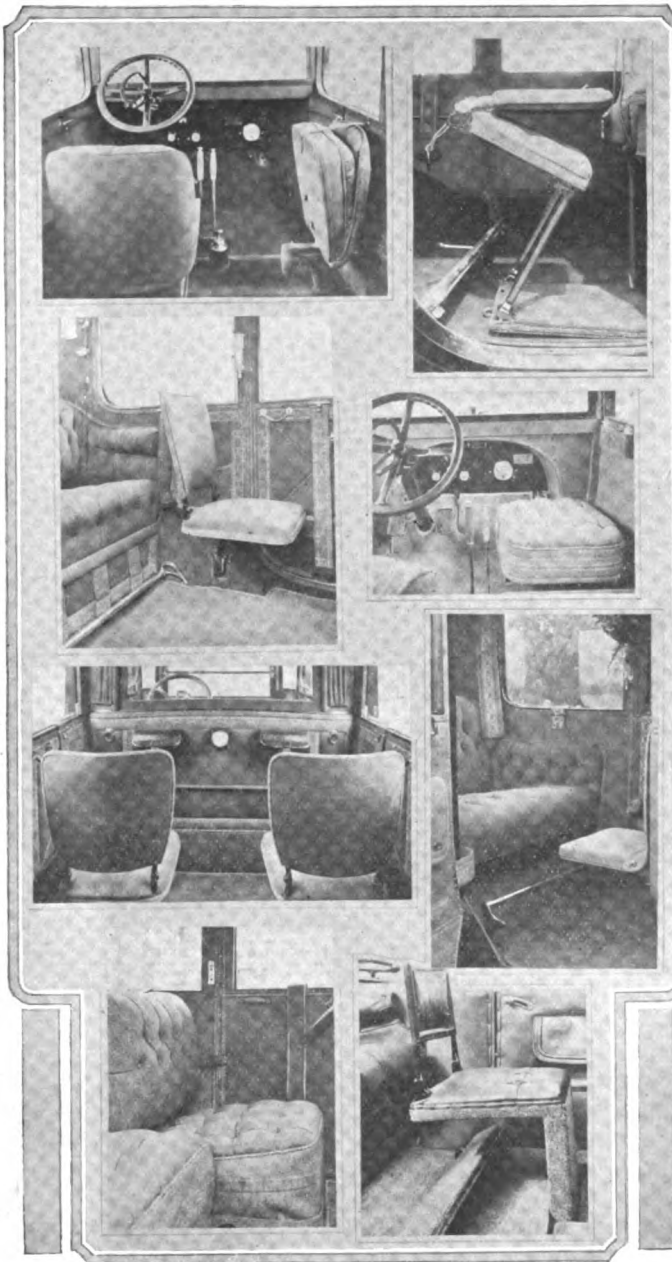
makers producing high grade berline and sedan types of limousines. The pronounced roof curve of a year ago is disappearing in favor of the softly rounded style, and there are more examples of doors arched into the roof than formerly. The use of larger windows, and of the sashless type, is gaining many adherents.

The sedan is generally a single compartment vehicle, admirably suited to the owner who drives. It is distinguished from the coupe by the forward seat of the driver and the rear seat

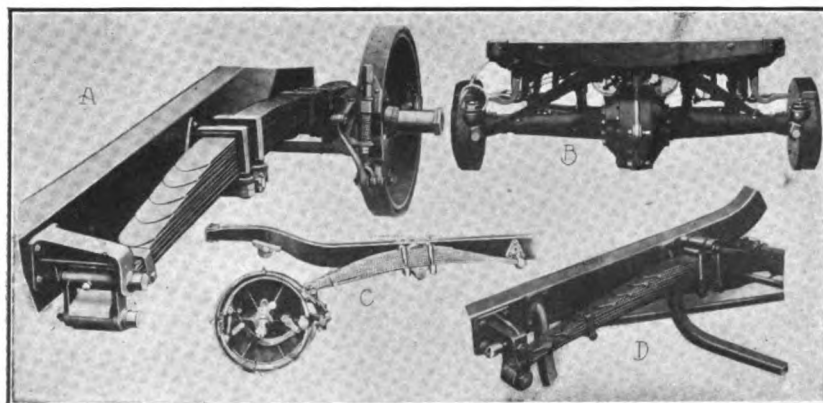
for the passengers. As with the coupe, the sedan type is intended to be operated from the same compartment as that in which the passengers sit, either by the chauffeur or the owner, and in this respect is in contrast with the limousine. The sedan has a curved top as a rule, and but one door to each side. One maker employs a single door, placing it on the right.

Beautiful examples of the coach builder's art are noted in the limousine, over 40 per cent. of the car manufacturers having either altered the style or marketed new designs. The general tendency is toward enclosing the driver's compartment and utilizing a slight rise in the body frame over the door. The general lines of the roof are the same as those used on the sedan. The upholstery and interior fittings are in keeping with the rich designs, many bodies being upholstered in soft textures of dainty hues.

Several ingenious



Richly Upholstered Interiors and Folding, Disappearing Seats Are Features of 1914 Body Designs.



Unconventional Spring Suspensions: A, Form of Cantilever on National; B, Rear Spring of Hupmobile; C, King Cantilever; D, Lanchester Cantilever Rear Springs on Willys-Knight.

examples of intermediate or extra seats are noted, both in the enclosed and open types of cars. Some are of the disappearing type, folding into a recess in the back of the front seats or into the floor, while others may be compactly folded and into a small compass. The majority of the seats in the enclosed bodies follow standard lines in swinging back out of the way when not needed and in having backs that fold.

Roomier Bodies.

Six and seven-passenger touring bodies are roomier than ever and there is a wide choice to be found. It is noticeable that more room is provided between the rise of the front seat panels and the forward edges of the rear seats, even when intermediate seats are not fitted. The width of the rear seat in some models is such that, coupled with its being placed well to the rear of the rear axle, on certain roads the passengers will seek intermediate seats when a full complement of passengers is not being carried.

The five-passenger touring body is the popular type, and seems more in demand than the four-passenger. The lines rarely differ from those of the large models made by the same companies, and with few exceptions additional tonneau seats are not provided. Some idea of the wide choice offered the buyer may be obtained from the statement that there are over 200 different five-passenger touring cars and that there are approximately 30 different models listing at under \$1250. In those cars listing between \$1250 and \$1999 there are about 64 styles.

It is noticeable that the 1914 touring bodies embody refinements that previous models lacked. The most important departure from standard design is the transition between the hood and the body, the abrupt break at the dash having been eliminated by the cowl, which is a continuation of the hood and extending back makes possible the streamline effect so popular abroad. To accentuate this effect many makers have discarded the side lamps, utilizing double-bulb headlights, the smaller bulb serving for city and

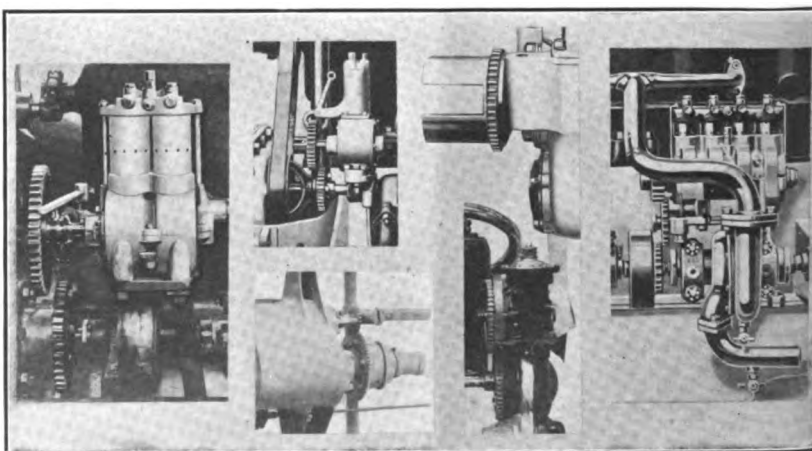
town use. One-man tops, so-called because they may be raised and lowered quickly by one person, are standard equipment with several makers.

The problem of storing the side curtains when not in service has been solved by patented storm curtains, such as the Jiffy and the Collins, and those designs operated without getting out of the car. In several instances these curtains are made to match the upholstery of the machine.

What is without doubt the most practical accessory added to the already complete equipment is the power tire pump. Several makers anticipated the demand, while others have made provision for its installation. The adoption of the power tire pump has eliminated manual inflation, a problem that was not wholly solved by the convenience of the demountable rim.

Power Tire Pump Popular.

Several methods of locating and driving the power pump are shown in accompanying illustrations. In many instances drive is taken from



Illustrating Standard Practice in Mounting and Driving the Power Tire Pump and Use of Universal Joint for Speedometer Drive.

a gear mounted on the shaft actuating the water pump, magneto, etc., the gear on the pump being thrown into mesh with the driving member by a lever, or a form of clutch arrangement employed to connect the driving and driven members. One maker takes the drive from the same shaft on which the fan pulley is mounted. The efficiency of these power pumps is such that the largest tire may be inflated in from one to three minutes, depending upon the capacity of the pump.

Motor Starters Vary.

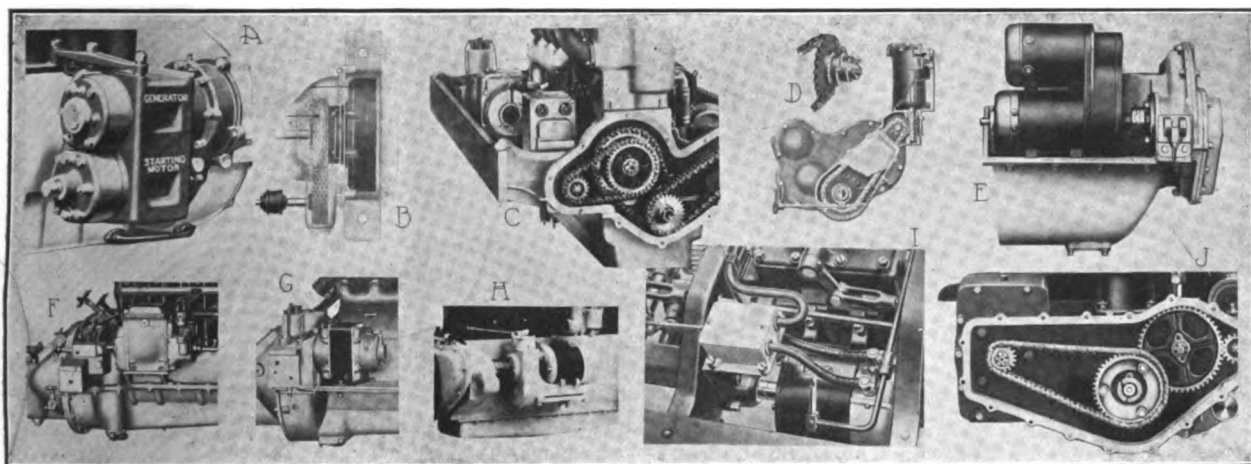
The past year has resulted in something like an approach to standardization in the mounting of the lighting generator and motor starter. Last year the methods were extremely varied, which may be said to have been due, in the majority of cases, to the necessity for adopting the system that could be obtained in time for the annual

ature shaft to the toothed periphery of flywheel.

The general tendency is to incorporate in the end cover of the motor a first reduction gear of 2:1 or 3:1, including an overrunning clutch in one of these gears, and obtaining a further reduction of approximately 8:1 or 10:1 between the sliding pinion and the flywheel. Meshing is made easy by connecting the shifter mechanism with the starting switch. The flywheel method of installation makes possible the location of the motor in front of or behind the flywheel and above or below the centre.

Single-Unit Types.

The next largest class employs a silent chain drive, but its application varies considerably, according to the system. With the single-unit type—the motor-generator—the gear ratio or drive changes considerably when the unit is being utilized for starting and for generating current. This



Illustrating Varying Installation of Lighting Dynamo and Motor Starter, Also Method of Applying Energy of the Latter: A, Krit Utilizes Tandem or Double Decker; B, Chalmers; C, Chandler; D, Jackson, a Vertical Installation with Drive Through Worm and Chain; E, Compact Grouping of National Units; F and G, Buick; H, Marmon; I, Motor Starter on Mitchell; J, Franklin.

displays, and, in many instances, applying it as best accommodated to the particular design of motor.

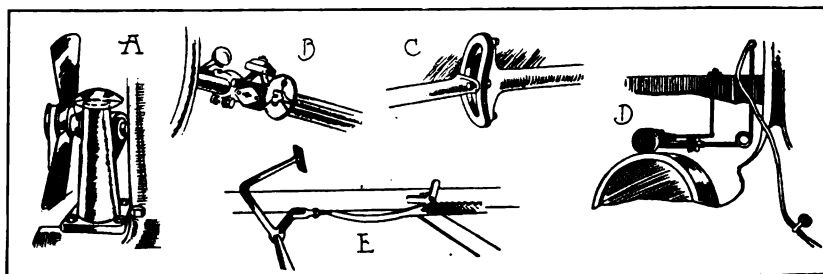
Flywheel Type the Vogue.

The method of installing the motor starter depends largely on the spaces available about the motor, which vary considerably in the different makes of engines. Where the manufacturer has brought out a new power plant provision has been made for imparting the energy of the electric motor, but in the majority of instances the unit has been applied without altering the design of the engine other than by adding a ringed gear to the periphery of the flywheel. This form is utilized by approximately 50 per cent. of the makers, it comprising the application of the power of the starter through a pinion on the arm-

is accomplished by the use of a reducing gear, which comes into action when the system is employed for starting. It is usually of the planetary type or some modification of it. The third class imparts the energy of the motor through the pump or magneto shaft to the timing gears, thence to the crankshaft. This method is practically a variation of the second, in that the timing gears are utilized to obtain the amount of necessary reduction.

Use Reduction Gearing.

Another method is that of mounting the motor beside the gearbox and driving into a gear on the main shaft in front of the gearbox. Meshing of the gears is effected by a pedal working a sliding gear, at the same time making the necessary electrical connections. The starting motor in



Mechanical Details of 1914 Models: A, Moline-Knight Oil Filler; B, Controls on Paige; C, Marmon Utilizes Universal Joint of Steel Rings; D, Pilot Uses a Friction Driven Tire Pump; E, De Soto's Pedal Operated Emergency Brake and Automatic Latch.

this instance is geared to the crankshaft at 25:1, gear ratio, and as soon as the engine operates under its own power a three-wheel clutch allows it to overrun the starting motor, to prevent injury to the gears or the armature. This overrunning clutch is necessary with almost all starting equipments, to protect the motor. In cases where the drive is by silent chain to the crankshaft, the clutch is usually incorporated in the chain wheel. In the flywheel method it is fitted in the second gear of the reduction.

Operation of Clutch Device.

The tandem or double-deck arrangement of the motor and generator is favored by many makers because of its compactness. The drive from the starting motor is usually taken through the armature of the dynamo half of the unit. If the car be standing, and the motor switch thrown in, the motor armature actuates a train of reduction gears between the two armatures. One of these gears is not permanently attached to the generator shaft, but operates through an overrunning clutch, a device that permits of drive in only one direction and which consists of an inner steel member containing recesses in which are hardened steel rollers. When these rollers occupy the larger end of the recesses the motion of the clutch is not affected, but upon one of the driving gears attempting to turn in the opposite direction, the rollers move along the recesses, locking and making the whole practically a solid drive. Power is transmitted to a pinion on the opposite end of the generator armature shaft, thence to the crankshaft by chain. Upon the engine starting to operate under its own power, there is a tendency to spin the motor at high speeds, represented by the reduction

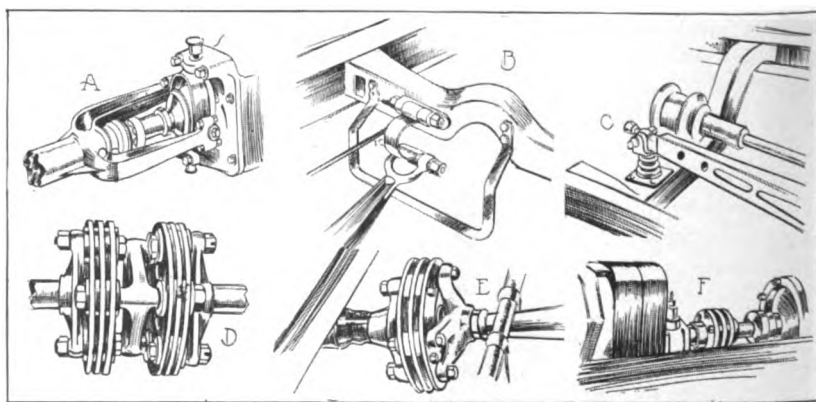
gearing, but the roller clutch comes out of action and prevents this. The generator armature then begins to rotate, the unit functioning as a dynamo.

Varying methods of mounting the motor starter are shown in an accompanying illustration, with the exception of the flywheel type, which has been fully explained. It will be noted that one maker mounts the motor starter vertically at the front

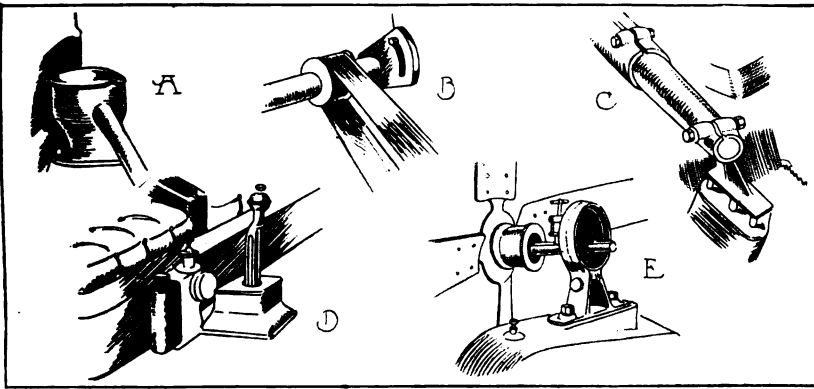
end of the engine, and utilizes a worm gear on the armature shaft, which engages a large gear on the countershaft. Keyed to the large gear is a small sprocket, from which a chain runs to the free member of ratchet starting clutch. This member is free to revolve on shaft, while the other member moves in and out of engagement on splined shaft with which it rotates. When the clutch is not engaged, the motor is entirely free from the starting mechanism, and can rock back and forth without restriction. A foot switch controls both the clutch and the starting motor.

Locating Two-Unit Types.

Where the two-unit system is employed, which is favorable to the six-cylinder power plant, the lighting generator is driven by the same shaft, or its extension, as that which drives the water pump and magneto. Several instances are noted where the dynamo is located at the forward end of the power plant and actuated by an auxiliary shaft, while the motor starter is mounted at the rear on the same side. Several makers have discontinued the magneto, utilizing the current generated by the dynamo for ignition and employing a distributor.



Torque Rods and Yokes: A, Buick Torque Yoke; B, Chalmers Torque Rod Connection; C, Forward End of Oakland's Torsion Rod Is Supported Above Drop Frame; D, Leather Universal Joint Used on Jeffery; E, Flexible Universal Joint on Willys-Knight; F, Flexible Magneto Coupling Employed on Stearns-Knight.



Constructional Details: A, Novel Breather on Stutz; B, Fan Belt Adjustment on Auburn; C, How Body Noises Are Eliminated on Chalmers; D, Compact Grouping of Controls on Keeton; E, Eccentric Adjustment of Marion's Fan Pulley.

Further evidences of electrifying the gasoline vehicle are noted in the electric gearshift in which the desired changes of speed are obtained by pressing a button on the steering wheel and utilizing the clutch pedal in the conventional manner. The shifting of the gears is accomplished by solenoids or magnets. Indicative as to what may be expected in 1915 is the announcement of the Entz electric transmission, which comprises a generator, motor and battery, these replacing the flywheel, clutch and gearset, and providing eight speeds controlled by a small lever mounted on the steering wheel. The lever also controls the starting, and changes in speed are accomplished by increasing or decreasing the slip between the field and the armature of the generator. The so-called "slippage" results in the generation of electric current, which is fed to the electric motor utilized to augment the power applied to the rear wheels when the low and intermediate speeds are employed. Upon the car attaining certain speeds, the electric motor is cut out, and it functions as a generator. Announcement also has been made of an electric brake which was exhibited at the New York show.

Mechanical refinements have been toward obtaining increased efficiency and silence. As a result of a finer balancing of the reciprocating parts, vibration is reduced to a minimum. In the endeavor to obtain silence many details have been improved. It is now becoming general practise to utilize flexible connections, as between the driving shaft and armature shaft of the magneto for ex-

ample, and some makers have adopted flexible universal joints. One manufacturer has made use of this arrangement between the clutch and transmission. It was first introduced abroad by Daimler to eliminate friction in the transmission of power. Sudden application of energy to the driving mechanism is held to be eliminated.

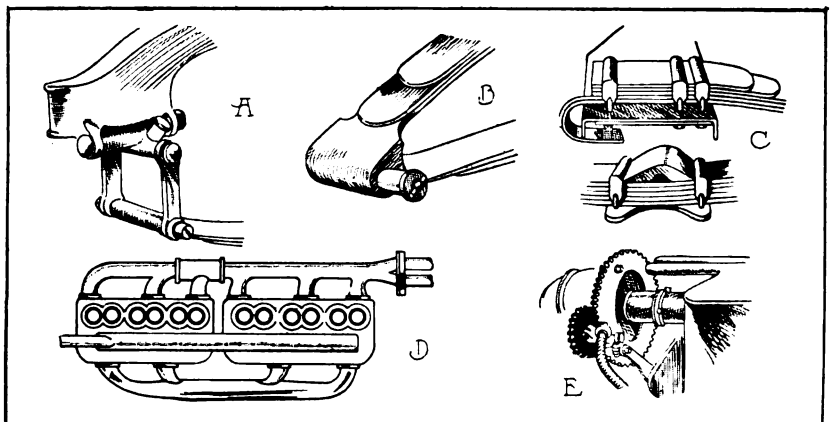
While it would appear that the leather utilized would not withstand the stresses to which the universal joint is subjected, it is stated that tests have shown that natural tanned leather will

withstand a twisting strain of 17,000 pounds, which is approximately 15,000 pounds above the normal strain existing in practise. One maker employs a single leather universal and places in front of it a slip joint. Another manufacturer utilizes steel rings as a material. Adjustable magneto couplings are now used by several makers and these are of decided value, in that the spark timing may be altered through a range of two degrees without having to reset the gears.

Improved Carburetion.

The cost of gasoline, and the demand for maximum mileage a gallon, have resulted in the use of larger valves, improved intake and exhaust manifolds and means for raising the temperature of the fuel. The carburetor is placed higher and in proximity to the water jackets, a position making for easy access, and one appreciated by the owner who cares for his car.

Many manufacturers realize that the number of motorists driving and maintaining their ma-



Spring Constructions and Suspensions: A, Moline Method of Extending Frame to Protect Fuel Tank and Attaching Rear End of Semi-Elliptic Underslung Rear Springs; B, Spring Eye on Franklin's Front Springs; C, Rebound Spring Device on Empire; D, Intake and Exhaust of Packard; E, Speedometer on Apperson Is Driven from Universal Joint.

chines is rapidly increasing and many components that formerly were not easily accessible may now be inspected with a minimum of labor. Simplicity and accessibility are features of the 1914 chassis.

A review of the chassis reveals the fact that designers are giving more attention to the mounting of the brake and pedal shafts and control levers. While it is a simple matter to attach a cross shaft to the side frame rails through the use of bearing brackets on either side, and to mount the clutch and brake pedal on it, yet trouble is experienced. Every car frame is subjected to a certain amount of variation in the relative positions of the side frame members, due to road inequalities, and allowance must be made for this frame movement. Unless the cross members are rigidly mounted and braced, slight changes in their position tend to cause binding of the shaft-carrying the clutch and brake pedals.

The majority of engineers realize this point and where cross shafts are utilized to carry pedals, a cross member parallels this shaft, in

proximity to it, so that movement is practically eliminated. Examples of efficient design are most noticeable in the unit power plant, which lends itself readily to correct mounting of the brake and clutch operating mechanism. The shaft carrying the pedals is easily bracketed to the side of the gearcase, and, being free from the frame, entirely eliminates opportunity of binding through movement of the last named.

Lubrication has been improved and simplified. Instead of a multiplicity of exterior piping and connections, the system in the majority of instances is self-contained in the motor. As a result the dash sight feed is disappearing. Attention has also been paid to maintaining the lubricant at predetermined temperatures, breathers have been improved, and the devices indicating the supply of oil are conveniently placed.

Summarized, the prospective purchaser of a 1914 model is offered a larger variety of cars to choose from; receives decidedly more value for his money than formerly, and is assured of maximum service at minimum upkeep expense.

TAKES OVER AXLE PATENTS.

Kardo Company, with \$1,000,000 Capital to Issue Licenses to Car Manufacturers.

An announcement of unusual interest to the industry is made in connection with the organization of the Kardo Company, Cleveland, O., Feb. 26. It is understood that the concern, which is capitalized for \$1,000,000, will be in the nature of a holding company, taking over certain axle patents heretofore held by the Packard Motor Car Company, Detroit; Peerless Motor Car Company, Cleveland, and American Ball Bearing Company, Cleveland. The officers are: President, Alvan Macauley of the Packard company; vice president, Theodore W. French, Peerless; secretary and treasurer, Fred C. Dorn, American Ball Bearing Company. The directors include: F. S. Terry, connected with the National Electric Lamp Company, a General Electric subsidiary; Walter C. Baker of the ball bearing company, and Milton Tibbetts, patent counsel for the Packard company. The published statement of the company follows:

The Packard Motor Car Company, the Peerless Motor Car Company and the American Ball Bearing Company, have, since the earliest days of the industry, independently and at large expense, developed axles that they believe are best suited to their respective trades. The patents on these axles, pertaining as they do to component parts, are so closely correlated and interlaced that the axles of either of the companies cannot be built without infringing the patents of the other companies.

This three-cornered patent situation has been a vexatious question for some time, each company claiming that the others and the trade generally infringe its axle

patents, and litigation has been frequently threatened. The situation became so acute and disturbing recently that a way was sought to relieve it. Careful study made it evident that the industry, including the three companies whose patents were directly involved, and automobile users generally, were interested in the final outcome and would be benefited by the removal of the menace and the avoidance of expensive and wasteful litigation. It seemed, therefore, that the patents should be so owned that licenses under them might be enjoyed upon reasonable and equitable terms by all manufacturers and users.

The patents are now owned by the Kardo Company. Some licenses under them have been granted and the company is negotiating others at the present time. Of course the usual royalty reservations will be made, and manufacturers will receive licenses that will insure them the right to make and sell to their customers axles that are free from charges of infringement. It is sincerely hoped and confidently expected that no litigation whatever will be necessary to the accomplishment of this constructive work.

GASOLINE STILL CHEAPER.

Another Reduction of One Cent Due to Severe Winter and Increased Production.

As announced in the last issue of The Automobile Journal, the price of gasoline was reduced Feb. 24, from 17 to 16 cents a gallon in 50-gallon lots or more. During the second week in March, a second reduction was announced by the Standard Oil Company, Texas Company and Gulf Refining Company, bringing the wholesale price to 15 cents. The reasons assigned for these reductions are: The severity of the winter, and the increase in production, particularly in Oklahoma and surrounding territory, where several new refineries are said to have been opened.

MORE WORKING CAPITAL.**Stockholders of Goodyear Tire & Rubber Company Approve Financial Plan.**

Without a single dissenting vote the stockholders of the Goodyear Tire & Rubber Company, Akron, O., at a special meeting, March 3, approved the plan of the directors for introducing \$4,000,000 of new working capital by the sale of stock. It is understood that already present Goodyear stockholders have subscribed for more than 80 per cent. of the stock to be offered, and it is anticipated that the rest of the offering will be taken by them before the rights expire.

It is explained by officials of the company that additional working capital was made necessary by the growth of business. Since 1911 this has increased from \$13,000,000 a year to \$33,000,000, on the basis of \$10,000,000 capital stock. In the meantime, the company has just completed additions to its factory sufficient for the handling of an annual business of \$50,000,000.

It is added that it is expected that the pneumatic tire output will shortly reach 10,000 a day. Comparative figures for three months of the present fiscal year with those for the same three months a year ago, show an increase in tires sold of 47, 55 and 82 per cent. respectively.

THE AJAX FROM SEATTLE.**Company Organized on Pacific Coast to Produce an Entirely New Six-Cylinder Machine.**

The Ajax Motors Company, headed by Seattle men and incorporated under the laws of Arizona, has been organized in Seattle, Wash., for the purpose of producing the Ajax car, a six-cylinder machine, which will be presented in two chassis, one fitted with a poppet valve motor and the other with an engine of the piston valve design. The list of incorporators includes George, Frank L. and Charles L. Parker.

Both engines will be six-cylinder units, with bore of 4.5 inches and stroke of 5.5, cast in pairs. The transmission will afford four forward speeds and reverse. No radius rods will be employed, the drive being taken through the two rear springs, transmission case, propeller rod housing and a ball and socket joint in the centre of the car.

Three styles of bodies will be offered as standard, these being roadster, phaeton and touring, the latter being designed for five and seven passengers. Limousine bodies also may be had

upon order. The wheelbase of the roadster will be 120 inches, of the phaeton and five-passenger touring 133, and of the seven-passenger and limousine 136. The Ward Leonard system of lighting and starting will be employed. It is expected that the company will be in a position to make deliveries from a plant in Seattle about Oct. 1.

ANOTHER BRISCOE COMPANY.**Will Produce Argo Machines in Factory Located Just Outside of New York.**

The Argo Motor Company has been organized in New York City for the production of a light car in a factory to be located just outside of the city, according to the preliminary announcement. The officials of the company are:

President and general manager, Benjamin Briscoe; vice president and general sales manager, L. E. Latta; secretary and treasurer, F. D. Dorman. Associated with these officers are a number of engineers, factory men and dealers who have had a part in Mr. Briscoe's former enterprises.



**F. D. Dorman, Secretary-Treasurer,
Argo Motor Company.**

Although it is maintained by the company that the product will not be a cyclecar, but a light automobile, the advance description would seem to indicate that the motor dimensions and weight were to be such as to place it in the true cyclecar class. The engine will be a four-cylinder unit, with bore of 2.31 inches and stroke of four, giving a piston displacement of 67 cubic inches. The weight is to be about 700 pounds. The wheelbase will be 90 inches, and the body will seat two passengers side by side. Thermo-syphon cooling, splash lubrication with pump circulation, cone clutch, sliding gear transmission, shaft drive, full elliptic springs and wire wheels 28 inches in diameter are among the constructional details revealed.

RECEIVER IS APPOINTED.

Announcement Also Is Made of Proposed Organization of New Company.

Upon application made by the directors of the Palmer & Singer Manufacturing Company, Long Island City, N. Y., maker of the Palmer-Singer car, John J. Kuhn, a lawyer, of the firm of Dykman, Oeland & Kuhn, New York City, has been appointed receiver by Judge Veeder of United States court in Brooklyn, N. Y. This action has caused some little speculation in financial circles, since it took place practically coincidentally with an announcement that Charles A. Singer, president of the concern, was preparing plans for the formation of a company to produce a new car, to be known as the Singer.

S. P. Woodard, secretary of the Palmer & Singer Manufacturing Company, is quoted in a published statement as follows:

It is stated by the officers of the company that the cause of this action was the fact that developments along certain lines during the last nine months had not proved profitable. Costly experiments were introduced, which at the present time have not been perfected and cannot be continued because of want of working capital.

The officers further stated that the cause of the present situation was not any inability to market Palmer-Singer cars, but that the demand for these cars continues in an increasing volume. On account of the first mentioned developments, the officers of the company felt it advisable to conserve the interests of the creditors and stockholders of the company by a receivership.

From other sources, it is understood that there has been some little difference of opinion between stockholders with reference to the experiments mentioned in the above statement. Some months ago the Palmer & Singer Manufacturing Company announced its intention of fitting 1914 models with a new type of motor, and Mr. Singer has been actively engaged in perfecting the details in connection therewith. Whether or not the new Singer car is to be equipped with this engine has not been made public. Mr. Singer is quoted as saying that the orders for Palmer-Singer cars on the books of that company at the first of the year were in excess of past records and more than sufficient to maintain the running capacity of the plant.

TO MAKE WOODWARD PUMPS.

Concern Is Organized in Detroit for This Purpose with Capital of \$50,000.

The Woodward Pump Company has been incorporated in Detroit, for the manufacture and distribution of the Woodward Impulse tire pump. The concern has capital of \$50,000, and the head-

quarters of the company are located at 222 Third street. The officers are: President, A. Woodward; vice president, E. L. Ackerman; treasurer, C. E. Blaesser; secretary, C. B. Woodward.

The Woodward pump was placed in the market in 1913, and is said to have met with decided success. It also is stated that the firm of Joseph N. Smith & Co., of Detroit, of which E. L. Ackerman is president, is largely interested in the new concern, and that the pump will be produced in its factory.

NEW STUTZ FACTORY.

Plans Completed for Erection of Structure Required by Increasing Business.

The Stutz Motor Car Company, Indianapolis, Ind., with which has been incorporated the Stutz Auto Parts Company of that city, has completed plans for the erection of a new factory building at Tenth street and Capitol avenue boulevard. It is understood that the erection of this structure was made imperative by the increasing demand for Stutz cars.

The building will be four stories high, of fire-proof construction throughout, and will cost about \$100,000. Work will begin about April 1. When completed the general offices of the company, which are now located at 430 North Capitol avenue, will be removed thereto.

PURCHASES NYBERG PLANT.

A. C. Barley Expected to Consolidate This with Streator Motor Car Company.

It was announced in the last issue that A. C. Barley of Chicago had purchased the Streator Motor Car Company's plant in Streator, Ill., and that it was expected that this concern would soon resume the manufacture of Halladay cars. Additional information from Streator states that Mr. Barley also has purchased the plant of the Nyberg Automobile Works, Anderson, Ind., the price paid being \$7500 in cash and the assumption of liens amounting to \$22,000.

It is now understood that it is the intention of the new owner to consolidate the two plants and to produce both the Halladay and the Nyberg for the 1915 season. It is further stated that two very low priced models, perhaps a cyclecar, will be added to the line.

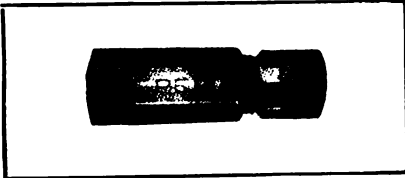
George Uihlein of Milwaukee has become general manager of the Universal Motor Truck Company, Detroit, succeeding F. K. Parke.

NEW ACCESSORIES FOR THE MOTORIST.

SMITH EASY TIRE VALVE.

Replaces Usual Construction and Reduces Labor to a Minimum.

The Smith Tire Valve Company, box 1965, Boston, is marketing the Smith easy pumping tire valve,



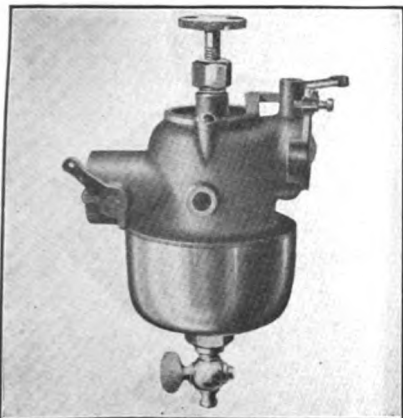
which comes in sets of four and is moderately priced. It is easily attached to the valve stem, the plunger of which is removed, as the Smith replaces this member. One of the qualities of the Smith device is that the largest sized tire may be inflated with a minimum of effort with a hand pump. Another feature that will appeal to owners is that the Smith valve opens with a very slight pressure, permitting of utilizing the pump from the beginning to the end of the stroke. This makes for economy of time, in that it is figured that approximately 60 per cent. of the stroke is required to open the ordinary tire valve.

STEWART CARBURETOR.

Special Ford Design, Dash Adjusted and Heated by Hot Air.

The Detroit Lubricator Company, Detroit, manufacturing the Stewart carburetors, has developed a design for the model T Ford motor, which is held to be very efficient, easily installed, and to make use of the heat of the exhaust manifold. It is supplied either with thumb screw adjustment or to utilize the regular Ford dash adjusting rod.

The principle of operation of the Stewart is held to be entirely different from conventional types, and the maker states that the proportions of fuel and air are accurately determined, irrespective of the throttle



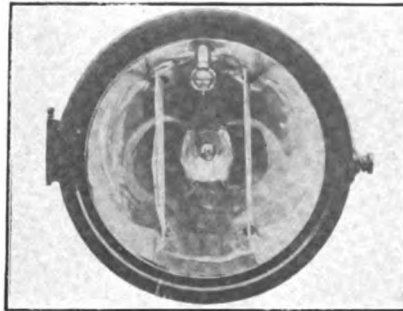
opening. Use is made of a metering valve, which moves up and down, according to the suction of the motor, and it is held that the amount of fuel and air admitted to the mixing chamber increases or decreases in exactly the same ratio, obtaining the correct proportions at different speeds.

The lower end of the metering valve extends down into the gasoline and around a taper. Because of the decreasing diameter of this pin the higher the metering valve is lifted the larger will be the opening into the aspirating tube, and the more fuel will be drawn up. There is but one moving part, the metering valve.

NODAZ.

Electrically Controlled Device for Eliminating Glare.

The Ward Leonard Electric Company, Bronxville, N. Y., maker of electric lighting and motor starting systems, is producing Nodaz, which is held to be a solution of the dazzle problem. In other words, the device permits the use of the electric head-



lights at full candlepower in the cities without conflicting with ordinances.

It comprises two pairs of translucent wings pivotally mounted in the reflector. These wings are opened and closed by magnets within the cover of the lamp, and are operated by pressing a button. With the wings closed, there is no glare, but it is stated there is a strong, diffused light, sufficient for operating on country roads. Pushing another button opens the wings, obtaining the usual rays.

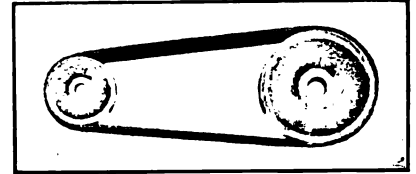
It is stated that whether the wings are folded or open, they do not perceptibly affect the efficiency of the bulbs, as they are very thin. The magnets controlling the device require but little current for operation; less than half that necessary with a horn, it is stated. One of the qualities of the Nodaz is that it may be attached to any headlight. In the illustration, the wings are shown folded or open. It is moderately priced.

Always consult the Classified Buyers' Guide when accessories, supplies, fittings, etc., are desired. The concerns listed are wholly reliable and worthy of your consideration in every way. The Guide is alphabetically arranged.

RUSCO FORD FAN BELT.

It Is Woven Endless and Is Uniform Throughout.

Few motorists give the fan that consideration it deserves. The majority are content if it operates at



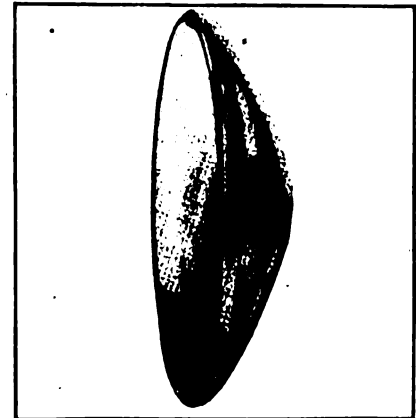
sufficient speed to keep the motor cool, and as a rule it is only when the cylinders show signs of heating that the tension of the belt is adjusted. With high speed motors, such as the model T Ford for example, it is essential that a high grade, properly adjusted fan belt be used.

The Russell Manufacturing Company, Middletown, Conn., is producing a fan belt for the Ford car that is woven endless, and the maker states that it will not stretch and is not affected by heat, moisture, etc. It is guaranteed to be uniform throughout and to give perfect service. It is not only inexpensive, but comes packed in a neat box.

NATIONAL REFLECTOR.

A High Grade Design for Acetylene Headlights.

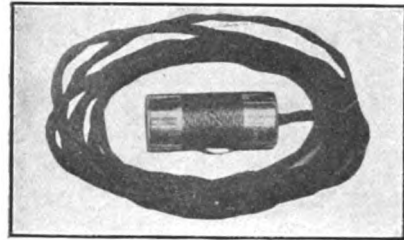
The National Reflector Company, Clarksburg, W. Va., is manufacturing the National reflector, a design for acetylene headlights, and the maker lays great emphasis on its durability and efficiency. It is made of blown glass, and it is stated that the double-wall construction gives both great strength and lightness. The silvering is inside of the reflector, a construction held to prevent cracking and peeling. That sudden changes of temperature will not injure the reflector, and that it will not become discolored in service, are claims made for the design.



CENTURY CIGAR LIGHTER.

Operates on Any Six-Volt Battery and Is Nicely Finished.

The Century automobile cigar lighter is marketed by Mabey's Electric & Manufacturing Company, Indianapolis, Ind., and is a very neat, compact design. It is made to operate on a six-volt storage battery or dry cells, and comes finished in black leather with all trimmings nickel plated. The switch is well designed, is of the push type, and included with the equipment is seven feet of silk cord. The dimensions of the Century are one by two inches. In attaching to the car the maker recommends running the cord from the battery up through the floor at the back of the front seat so that the lighter will be convenient for all passengers.



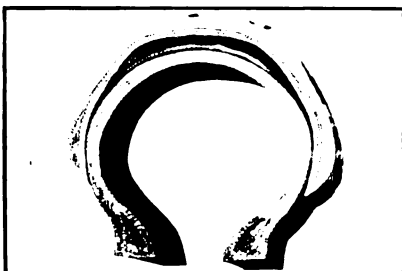
The company is also marketing an electric radiator heater for preventing freezing of the water in the cooler. The wiring plan is such that the usual storage battery and garage lighting system are utilized independently.

STANDARD TIRE PROTECTOR.

Reinforces Side Walls as Well as Tread of Shoe.

Announcement is made by the Goodyear Tire & Rubber Company, Akron, O., that it has formally taken over the manufacture and sale of Standard tire protectors as a part of its automobile tire department. This action follows several years of watching, testing and investigation, and the company believes that there is a legitimate and useful field for the device.

The Standard tire protector is simply a tire tread, fashioned separately. It not only comes well down over the side walls of the casing to which it is applied, protecting them, but is so ingeniously constructed that when once applied it remains firmly in place without any other fastening than the inflation pressure of the tire to which it is applied and covers.



It is stated that it is quickly and easily applied, and that it cannot injure a tire carcass, as vulcanized repairing frequently does. It is also held to be available for service if the old casing gives out sooner than expected. The Standard is intended to obtain more mileage from shoes that are worn on the tread, but still strong as to side walls. It effects tire economy, especially in the larger tire sizes.

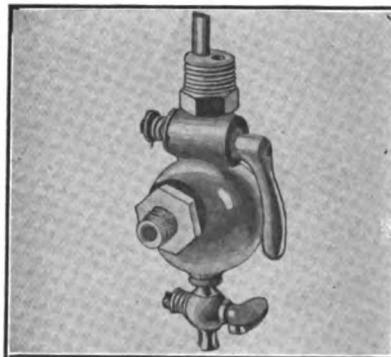
TRIO FILTER.

Made for Standard Models, Also Special Design for Ford Car.

The Trio Manufacturing Company, 1206 Bellevue avenue, Detroit, is marketing a combination sediment trap and gasoline reserve supply device which is intended to eliminate the necessity for carrying extra fuel. It is designed especially for those cars not equipped with auxiliary fuel tanks, and the maker states that the Trio not only insures a reserve supply of fuel, but makes a rigid tank connection.

It has a sediment trap to catch all foreign elements, and is also provided with a positive shut-off to the carburetor. A petcock at the bottom of the Trio permits of drawing fuel for priming purposes, etc.

The illustration shows the valve in



a closed position. When the lever is turned to a forward position, the reserve supply is obtainable. With the lever turned half-way over to an opposite position, the tank may be drained. The valve is of large dimension and is ground to a gasoline tight fit, and comes ready to install. It is stated that it may be fitted in 15 minutes and that the services of an expert are not required. The company is marketing a special design for Ford cars.

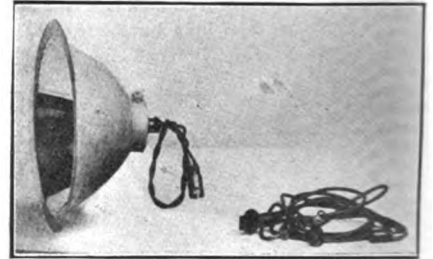
NEW EQUIPMENT.

With the approach of spring the thoughts of the motorist turn to the overhaul and new equipment. The manufacture of a large number of devices eliminating much of the hard labor that formerly existed, has resulted in many owners undertaking the work of placing the machine in order. In this department will be described new and special tools, as well as equipment that makes operation and maintenance easy.

C-S FORD REFLECTORS.

High Grade Design with Many Practical, Useful Features.

The Culver-Stearns Manufacturing Company, Worcester, Mass., is marketing the C-S patented lighting out-



fit for model T Fords, which is designed to operate direct from the fly-wheel generator. The outfit consists of one pair of heavily silver plated reflectors, all necessary wiring, bulbs, switch, Ediswan connectors, etc.

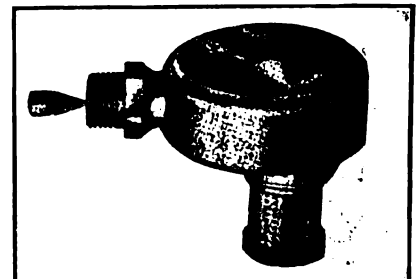
One of the qualities of the design and one which will appeal to owners of Ford cars contemplating converting their gas lights into electric units, is that in the event a bulb becomes burned out or broken, it may be removed and a new one fitted without displacing the reflector. This is made possible by a patented device at the rear of the reflector, it being displaced by loosening a knurled nut and rotating the part slightly.

THE VOTEX.

Automatically Admits Air to Intake Manifold, Weakening Mixture.

The Sireno Company, 20 Rose street, New York City, is marketing the Votex, which is fitted in the intake manifold between the carburetor and the cylinders. It is held to be automatic in its action, delivering a certain amount of air to an imperfect mixture, and as required. The action of the Votex is stated to be as follows:

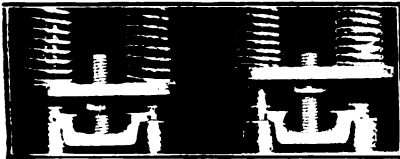
When the motor is operating idle, the Votex allows a small amount of air to enter the intake manifold, partially relieving the suction of the engine and weakening the mixture. When the throttle is opened quite wide the vacuum in the manifold is relieved and allows the Votex to close, enriching the mixture. When the motor gets up to speed the throttle is closed down and a very high vacuum is again created in the manifold, thus allowing the Votex to open and supply air, weakening the mixture to an economical point.



PERFECT VALVE LIFTER.

Compresses Two Springs at Once and Is Designed for Ford Cars.

Winton L. Smith, 78 Clinton street, Newark, N. J., is marketing the Perfect valve grinding set, which is de-



signed especially for the model T Ford motor. The equipment comprises the Perfect valve spring lifter, valve turning tool, wrench socket, grinding paste, gauge and complete instructions. The application and use of the valve spring lifter is shown in the accompanying illustration. It comprises a plate which fits under the spring washers and the lifter, which is fitted over the pushrod housing.

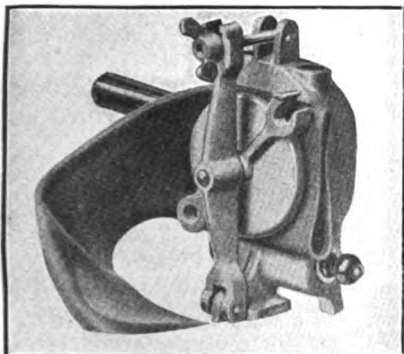
By rotating a nut on a threaded bolt integral with the lifter, two springs are compressed, enabling easy removal of the lock key. The wrench socket is utilized for displacing the cylinder bolts. The paste comes in two tubes, fine and coarse abrasive. The gauge referred to is utilized to determine the correct distance between the pushrods and the tappets. The equipment comes neatly packed and is moderately priced.

SHALER VULCANIZER.

Safety Vul-Kit Is Adaptable to Tires and Inner Tubes.

The C. A. Shaler Company, 850 Fourth street, Waupun, Wis., maker of vulcanizing equipment, has brought out the Shaler Vul-Kit vulcanizer, which is offered at a very attractive price. It is the result of considerable experimentation to develop a vulcanizer that could be carried easily in the tool box and be operated anywhere at any time, thus making it adaptable for roadside repairs.

The maker states that there is no danger of fire if the device be accidentally upset, and that the fuel supply is limited to that required for perfect vulcanization. To operate it is filled with fuel and lighted.



When a tube is to be vulcanized it is clamped against the vulcanizing surface by a swivelled plate inlaid with asbestos to retain the heat and to prevent pinching the tube. It is stated that a repair cannot be spoiled by clamping one side of the plate more tightly than the other. The handle is always cool, permitting of removing the vulcanizer from the work as soon as the repair is finished. The Vul-Kit is adaptable to casings and without removing the latter from the rim.

MOSCO FORD WHEEL PULLER.

Fits All Ford Cars and Is Adjustable to Hub Threads.

The Motor Specialties Company, Waltham, Mass., with New York office at 50 Church street, is producing the Mosco anti-rattling ball sockets, which are constructed in two sizes for the model T Ford automobile. The larger model is utilized to eliminate lost motion and rattling of the front radius rod, it replacing the cap member. The smaller size is used in place of the ball socket cap on the steering gear connecting rod. Both the parts referred to are subject to wear, as provision is not made for



lubricating them, consequently in time lost motion develops in the steering linkage.

The Mosco conforms to the dimensions of the Ford parts, and is easily attached, the usual bolts being utilized. It is provided with a plunger, the end of which conforms to the shape of the ball end of the parts, and a cushion device is incorporated to absorb road shocks and prevent these being communicated to the hands of the driver. Means are provided for taking up any lost motion in the Mosco. It is made of high grade material and is moderately priced.

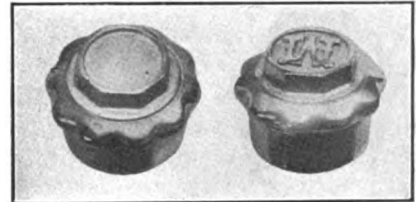
CARBON REMOVERS.

The editor of this department has received several letters from readers relative to the merits of the fluid and dry carbon removers marketed. Personally he has had no experience with them. The fact that they have been on the market some time is indicative of their merits. In the opinion of the writer the oxygen process is decidedly satisfactory. The equipment is not expensive and there is no reason why several owners living in the same neighborhood could not club together and purchase an outfit.

A. A. A. FORD HUB CAPS.

Substantially Constructed, Plain and with Initial Letters.

The A. Auto Appliance Company, 114 West Exchange street, Providence, R. I., maker of Ford special-



ties, is manufacturing several models of Ford hub caps, which are not only attractive, but are substantially constructed. They are cast in bronze, then machined to size, and the threads are accurately cut. The caps are of sufficient thickness to withstand severe service and one of the qualities emphasized by the maker is that they cannot be crushed when force is utilized to remove them if they become frozen.

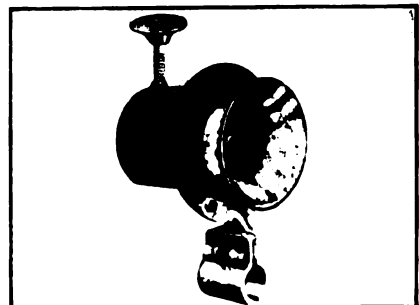
The edges are scalloped and the usual hex head is provided for removing and replacing with a wrench. Each cap is nickel plated and highly polished. The A. A. A. Ford caps come plain and with initials, and their use considerably improves the appearance of the machine.

NEW KLAXON HORN.

Designed for Motorcycles and Is Manually Operated.

The Lovell-McConnell Manufacturing Company, Newark, N. J., maker of the Klaxon line of horns, has brought out a model for motorcycles which is exactly like the regular hand Klaxon for automobiles except that it is fitted with a short projector and a special clamp for attaching to the busbar of the motorcycle.

It provides the motorcyclist with an efficient signal, one that is operated without the service of batteries. It operates on the Klaxon principle of a vanadium steel diaphragm vibrated by a high speed cam wheel. In the case of the electric Klaxons this wheel is rotated by an electric motor; in the motorcycle design by a train of gears that attain high speed under the pressure of the pushrod. The new model has the true Klaxon note and is sold under usual Klaxon guarantee, covering service, etc.



WITH THE CYCLECAR MANUFACTURERS.

New Models Being Announced Very Rapidly, and Work of Testing Machines Is Progressing in Satisfactory Manner--Falcon and Imp Have Experience in Snow.

NEW ENGLAND has been experiencing, during the present week, its first opportunity to view the latest arrival in the automobile industry, and, as was expected, this was made the occasion for presenting new cyclecar models. The term is used in its general sense, since the machines on exhibition at the Boston show might be held to include representatives of all three classes under the definitions of the Cyclecar Manufacturers National Association.

The designs revealed at the Boston show, or in connection therewith, are presented in detail elsewhere in this issue. It has been deemed best to reserve the space available in this department to a more general consideration of the cyclecar end of the industry, and it will be noted that the number of new makes that have been announced in the past two weeks is sufficient to

tion of the engineers, and some of them cannot well be determined until the cyclecar has seen actual daily service in the hands of owners. Such long distance tests as machines have been subjected to appear to indicate their thorough practicability. The summer of 1914 will do much toward eliminating any doubts that still remain. The cyclecar—true cyclecar, light car and small car—is here. The public is invited to help make it an established institution.

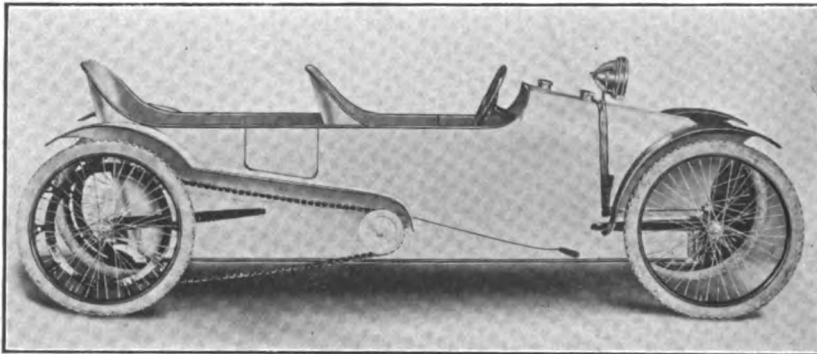
DETAILS OF KELLER-KAR.

Maker Has Decided to Replace Two-Cylinder Motor with a Four-Cylinder Engine.

Although the original model produced by the Keller Cyclecar Corporation, 143 North Dearborn street, Chicago, was equipped with a two-cylinder, air-cooled motor of 3.5-inch bore and 3.625-inch stroke, it has now been decided to utilize a four-cylinder, water-cooled engine with bore of 2.5 inches and stroke of three. This does not change its classification, under the rules of the Cyclecar Manufacturers National Association, of which the concern is a member. The officers of the company are the following: President and treasurer, Paul A. Keller, and vice president and secretary, H. P. Keller.

The motor dimensions and the weight, 425 pounds, place the machine in the true cyclecar class. Lubrication is by splash, carburetion by a Schebler and ignition by Atwater Kent Unisparker. Power is transmitted by friction discs, and final drive is by Peerless V belts. Springs are inverted elliptic, which might be termed another name for cantilever.

The frame is of steel, cellular construction, and the body, also of metal, provides for seating two passengers tandem. The seats are upholstered in leather, and the car is fitted with an electric lighting system. The wire wheels carry 28 by 2.5-inch tires. The wheelbase is 96 inches and the tread 36.



The Keller-Kar Is a True Cyclecar with Four-Cylinder Motor and Tandem Seating Arrangement.

make a very respectable showing of themselves.

With the approach of spring, there is every indication that those who are desirous of securing a cyclecar will be confronted with a long list from which to make selection. In many instances it will be found that concerns have secured manufacturing facilities, and it would appear that every effort was to be made to supply the extraordinary demand expected as a result of the public interest which has been reflected in the various shows held since the beginning of the year.

The situation is rapidly becoming clarified. Road tests are under way in many sections of the country. It will still be some time before all the details will be worked out to the entire satisfac-

HERRESHOFF LIGHT CAR.**New Machine of the Cyclecar Type Designed by Well Known Automobile Man.**

As was stated in the last issue of The Automobile Journal, the Herreshoff Light Car Company has been organized, with factory in Troy, N. Y., for the production of the Herreshoff light car, designed by Charles Frederick Herreshoff, vice president of the Herreshoff Motor Company, Detroit. The machine will be marketed through the Herreshoff Motor Sales Company, with offices at 251-253 River street, Troy. The officers of the company are: President, Northrup R. Holmes; vice president, F. C. Pond; secretary, A. L. Johnson; treasurer, George N. Nay.

The machine is classified as a light car by the maker, although its piston displacement, the four-cylinder motor having bore of 2.375 inches and stroke of 3.25, is such as to place it in the true cyclecar class. The weight is 750 pounds, which is the dividing line between a true cyclecar and a light car. The wheelbase is 90 inches and the tread 44.

The motor is with the cylinders cast en bloc. The maker's rating is 16 horsepower. Cooling is by thermo-syphon. Lubrication is by splash with pump circulation. Ignition is by Atwater Kent Unisparker with storage battery. The carburetor is fed by gravity from a tank in the cowl dash. The machine is fitted with a mechanical starter operated by lever.

The clutch is a leather faced cone, with spring inserts, and the selective sliding gear transmission affords three forward speeds and reverse. Springs are of the cantilever type. Axles are of one-piece I beam section, semi-floating rear. The wire wheels carry 28 by three-inch tires.

The frame is of pressed steel, and the body, also of steel, is of streamline design, fitted with deep Turkish upholstery. The equipment includes a windshield, built into the body; top, two large electric searchlights with dimmers, electric rear lamp, complete set of tools, etc. The two passengers are seated side by side.

BREAKING ROADS WITH FALCON.**Virginia's Heaviest Snow Fall in 20 Years Affords Cyclecar an Interesting Test.**

The heaviest snow fall in more than 20 years recently swept down the historic Shenandoah valley, giving that portion of the Sunny South an appearance much more appropriate to Labrador. Incidentally, it afforded the Falcon Cycle-

car Company of Staunton, Va., an opportunity to subject one of its Falcon cyclecar chassis to a test which still further demonstrated its ability to cope with unusual conditions.

The factory, located on the windswept ridge of Richmond hill, overlooking the city, was surrounded by drifts; in many places about the level yard the snow lay 10 to 12 inches deep. It was wet and packed solidly the first day of the storm, sticking to the wheels and piling up in front of the car. It required nearly five minutes of steady bucking to break through a two-foot drift in front of the factory door, and during the entire morning the little machine broke trail around the factory and along the road to Waynesboro, with pounds of snow clinging to the wheels. Despite the apparent risk of jamming the exposed pulleys, there was no sign of belt trouble, both belts giving splendid traction and clearing out the pulleys without difficulty,



Falcon Test Chassis Breaking Out the Roads in Vicinity of Staunton, Va.

according to a letter from the company.

In the afternoon a sharp freeze turned the snow to a crisp, powdery condition, and through the half-broken wagon roads, the little Falcon climbed long grades and bucked newly formed drifts in such manner as to leave little room for doubting its ability. The fun ended when, turning out to avoid a wagon, a snow drift larger than the others confronted the driver, who elected to rush it at full speed. The machine went through the drift, but the crew decided it was time to return to the factory and get dried out. An accompanying illustration shows the little machine at work breaking out the roads.

It is pointed out in this connection that the roads in the vicinity of Staunton offer exceptional advantages for testing cars. The famous National Valley pike and the county pikes give combinations of long, level, perfectly surfaced

stretches for speed, and of grades which would try almost any machine in the country. Over-shadowing the city is Betsy Ball mountain, at one time held to be inaccessible to automobiles, but said to have been negotiated twice in one day by a Falcon chassis. Off the county pikes in any direction are roads of red clay, as sticky as the notorious Arkansas gumbo. It is under such road conditions that Falcon cyclecars are tested out before being placed on the market

WARD FROM MILWAUKEE.

Brief Details Concerning Machine Placed in the Market by Ward Butler.

In the absence of further details, it is impossible to classify the Ward cyclecar, made by the



Maker of Ward Directs Attention to Lack of Departure from Standard Automobile Lines.

Ward Cyclecar Company, not incorporated, Milwaukee, Wis., represented by Ward Butler, under the definitions recently adopted by the Cyclecar Manufacturers National Association, although from such information as is available it would appear that it was properly placed as a true cyclecar. The wheelbase is 96 inches and the tread 41. The two passengers are seated side by side.

Beyond stating that the motor is a Mack, and that the machine is fitted with a friction transmission and V belt drive, no further information has been made public regarding the mechanical details. It is pointed out, however, that the car is of standard underslung construction, with unusually long springs, 36 inches in the rear and 34 in front. This is held to give exceptionally easy riding qualities. Attention also is drawn to the lack of departure from standard automobile practise, insofar as the general appearance of the machine is concerned.

Mr. Butler states that the car shown has carried the driver and passenger a trifle over 50 miles an hour, and has taken rough country roads at a speed which would mean destruction to the larger machines. He adds that it has made from 35 to 50 miles to a gallon of gasoline.

IMP MAKES QUICK TIME.

Snow and Slush Offer an Exceptional Test Over Country Roads in New Jersey.

Another demonstration of the practicability of the light weight, narrow tread cyclecar was made March 4, when President H. C. Fairchild of the Cyclecar Distributing Company, Imp distributor in Newark, N. J., drove one of these little machines, made by the Imp Cyclecar Company, Auburn, Ind., from Newark to Paterson, N. J., a distance of 20 miles in 1:12:00. The roads were covered with snow and slush, as the result of the heavy storm which occurred in this section March 1-2—in many places to a depth of 1.5 feet.

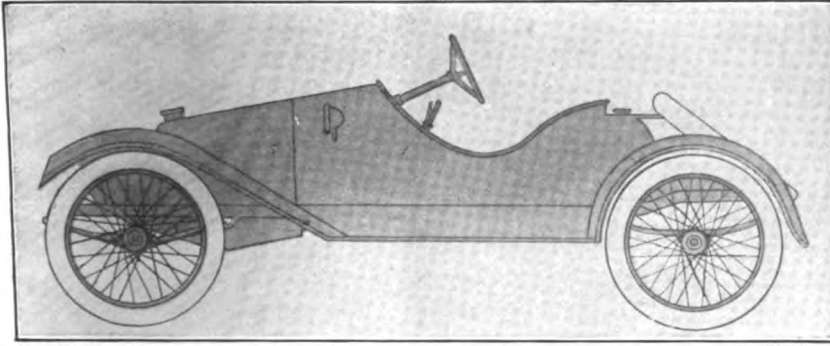
Mr. Fairchild was accompanied by Harvey Batzle of Bloomfield, N. J., as passenger and observer. They left the office of the Newark Star at 1:40 in the afternoon and made the 10 miles between that city and Passaic in 42 minutes, despite conditions which had tied up traffic of all kinds for three days. The last 10 miles between Passaic and Paterson were covered in exactly one-half hour.

The total gasoline consumption was three quarts. In one place water hub deep was encountered, but neither this nor the snow and slush affected the action of the belt drive. At the conclusion of the run the little car was placed on exhibition at the Paterson show and attracted a great deal of attention.

HAWK APPEARS IN DETROIT.

Another Machine of the True Cyclecar Type Which Has Standard Automobile Tread.

As has been stated in these columns before, there are very few true cyclecars in this country which have standard automobile tread, but the list is increased by one by the appearance of the Hawk, the product of the Hawk Cyclecar Company, with factory at 256 Harmon street, Detroit. The officers of this concern are: President, Frank Slater; vice president and secretary, L. J. Philippart. The machine is a side-by-side seater with wheelbase of 100 inches, weighing approximately 600 pounds.



Attractive Roadster Design Utilized with A. C. Four-Cylinder Model.

The Hawk is equipped with a De Luxe two-cylinder, air-cooled, V type motor, having bore of 3.37 inches and stroke of 3.67, and being rated by the maker at 9-13 horsepower. Ignition is by Atwater Kent Unisparker and carburetion by a Schebler. Power transmission is by friction discs and belts. The wire wheels are fitted with 28 by three-inch tires. The equipment includes two gas searchlights, two oil side lamps, rear lamp, Prest-O-Lite tank, Sears-Cross speedometer, top, windshield, horn, tools, etc.

A. C. FROM NEW ORLEANS.

Practically Is Presented in Two Chassis Models and with Three Body Types.

Announcement was made in these columns recently of the organization of the Autocycle Company, New Orleans, La., which was to enter the cyclecar field, but the details of the product were not available at that time. It now appears that this is to be known as the A. C., and it will be presented in two chassis models with three body types.

The officers of the company are: President, Arthur B. LeCour; vice president and sales manager, W. J. Homer; secretary, George E. Dicks. The factory has been located on Girod street, and it is stated that this is fully equipped for a production capacity of 10 machines a day. The sales office is at 811 St. Charles street. Agency contracts are said to have been closed for 100 cars, and others are pending, which are expected to call for another 100.

Motor dimensions are not revealed by the maker, and the same holds true with respect to the weight, but from such information as is available, it would

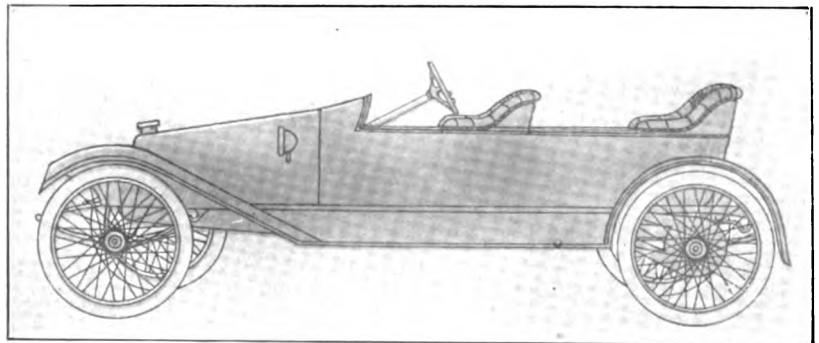
appear that one of the A. C. chassis must be listed as a light car, while the other may be regarded as a true cyclecar. The former has a four-cylinder engine rated by the maker at 12 horsepower, and to this are fitted a roadster type of body, with seats arranged side by side, and a light delivery van. The other chassis has a two-cylinder V motor rated by the maker at 10 horsepower, and the bodies fitted thereto are

a tandem two-seater and a delivery van.

The four-cylinder chassis has wheelbase of 100 inches and 36-inch tread. The motor is water-cooled, and drive is by shaft. The frame is of pressed steel, suspended on full elliptic springs. The wire wheels carry 28 by 2.75-inch tires with the roadster and 28 by three with the delivery van. Equipment with either body includes electric lights and starter. A top and windshield may be had with the roadster at a slight extra charge.

The wheelbase and tread are the same with the two-cylinder chassis, but the motor is air-cooled and drive is by belt. In all other respects the specifications are identical with the other, except for the equipment, which does not include electric lights and starter.

The Continental Engineering Company, formerly located in Minneapolis, Minn., instead of Milwaukee, Wis., as previously stated in these columns, has been incorporated under the laws of Illinois and has opened headquarters at 1305 South Michigan avenue, Chicago. It will manufacture motors for cyclecars and light cars, under the direction and management of J. E. Pfeffer. It is also understood that this concern has been experimenting on a cyclecar to be produced in two-passenger and delivery car models.



Tandem Seating Cyclecar Body Fitted to A. C. Two-Cylinder Chassis.

JOHNSTON IS PRESIDENT.

White Company's New York Manager Heads Dealers' Association in That City.

The board of directors of the Automobile Dealers' Association, Inc., of New York City, met March 3, for the purpose of electing officers for the ensuing year, as follows: President, R. H. Johnston, manager of the White company's branch; vice president, Charles H. Larson, of the Oldsmobile agency; secretary and treasurer, Frank Eveland, Stevens-Duryea; general manager, Charles A. Stewart. Mr. Johnston succeeds Arthur M. Day, but the other officials were re-elected.

Very soon President Johnston will announce the personnel of a special committee to have in charge matters in connection with the large number of bills pending before the state legislature, and the proposed ordinances before the board of aldermen. Ever since the incorporation of the association, it has been very active in everything that would help to protect the automobile industry, and it is expected, by those who know Mr. Johnston best, that under his supervision, this work will be carried on even more vigorously in the future.



R. H. Johnston, President, Automobile Dealers' Association, New York City.

TROPHY DONOR OBJECTS.

Glidden Award Will Not Become a Prize for Longest Journey to Meeting.

Charles J. Glidden, donor of the trophy bearing his name, which has been one of the most noted automobile prizes in the world, is quoted as saying that he will not grant his permission to have the cup awarded to the person covering the

longest distance in attending the proposed mid-summer meeting of the American Automobile Association in the White mountains this year. The trophy is now held by the Metz Company, Waltham, Mass., it having been won by a team of three Metz cars during the national endurance run of 1913, from Minneapolis, Minn., to Glacier national park, Montana.

In view of the fact that the suggestion was made that this classic award be utilized in the manner stated above, it would appear that as yet no plans had been made to hold a national tour this year. It is expected that the Glidden trophy will be the chief award in a transcontinental tour to the Panama-Pacific exposition in 1915.

FIRST TO CROSS THE ANDES.

Johnson Martin Drives Buick Car from Coast to Coast in South America.

The Pan-American Union in Washington, D. C., was in receipt of a cablegram, Feb. 28, from Johnson Martin, formerly of Glen Ridge, N. J., and a Princeton football player of note, announcing his safe arrival in Santiago, Chile, after being the first to cross the Andes in an automobile. Martin left Buenos Aires, Argentina, Jan. 31, in a 25 horsepower Buick car, made by the Buick Motor Company, Flint, Mich. His cablegram read as follows:

Arrived safely this morning in Santiago. Highest altitude 13,000 feet. Everything snow above 11,000 feet. Terrible cold. Two weeks in mountains crossing Continental Divide. Feat never before accomplished. Great enthusiasm Santiago and Valparaiso.

JOHNSON MARTIN.

Martin graduated from Princeton in 1907 and has been representing the Buick car in South America since the organization of the General Motors Export Company, three years ago. He began a year ago to study the mountain trails for this attempt, and was accompanied on his trip by a mechanic. He also took along rope, tackle, shovels, picks, a small blasting outfit, two rolls of canvas about 100 feet in length, fitted with heavy ground spikes at either end (to be used as a temporary surface where the trail proved to be too slippery or too steep for traction), and other necessary paraphernalia.

He first crossed about 1000 miles of swamps and cattle country before reaching Mendoza, from which point he headed toward the famous Uspallata pass. The cablegram quoted above was the first word that had been received from him in this country since he left the city of Buenos Aires.

MECHANICAL NOTES FOR OWNERS.

Inexpensive and Easily Made Cabinet for Storing Small Material---Why Storage Batteries Fail---Home Made Oil Can Holder---Ford Magneto Hints.

PRACTICALLY every owner who attends to the repairs of his machine accumulates a collection of nuts, bolts, screws, etc., and usually these are kept in the drawer of the work bench or in a box. As a result, when a particular sized nut is wanted, the contents of the box is dumped on the bench or floor and a search made for the particular article. Such a method of storing parts makes for a decided loss of time, and many times new material is purchased when it is in stock.

In an accompanying illustration is shown a systematic method of storing the materials referred to, the plan being one adopted by a reader of The Automobile Journal. A predetermined number of cigar boxes, those holding 50 cigars for example, were obtained, and the covers removed. In the illustration 12 are shown.

A cabinet is made from white wood or other suitable material, it being constructed with partitions to retain the boxes as indicated. To each box is fitted a handle and a label is also pasted on the box. The handles were obtained at a hardware store for a few cents.

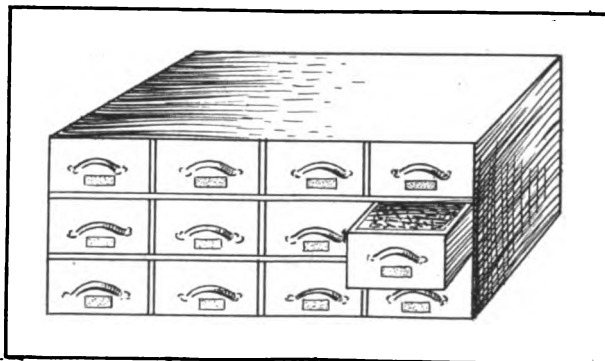
In arranging the boxes or drawers the owner placed cotter pins in one, lock washers in another, etc. Some of the boxes were sub-divided to retain different sized screws, for example. With each compartment marked, it is obvious that it is a simple matter to locate the material needed and quickly. The cabinet could be made sufficiently large to store the many useful parts and material necessary in the maintenance of the automobile.

WHY BATTERIES FAIL.

A complaint sometimes made by owners of cars equipped with electric motor starting and lighting systems is that the battery will not hold a charge. The Willard Storage Battery Company, maker of LBA batteries, explains that invariably this is caused by neglect, though not always on the part of the owner. It may be due to the fact that the machine stood for some time on the showroom floor and that a number of starts were made to demonstrate the action of the motor starter without operating the dynamo or replacing the current utilized. The owner of the car thus receives it with the battery in prac-

tically an exhausted condition, or he may use the machine in the city, making a large number of starts and without operating the dynamo at sufficient speed or long enough to properly charge the cells.

Under such conditions the battery should be removed from the car and given a long charge at a very low rate, one that will not cause it to heat above 100 degrees Fahrenheit at any time. This charging should be continued, testing the gravity of the electrolyte at frequent intervals by means of a hydrometer syringe. The length of the charge will depend upon the condition of the cells and may require two days or three weeks to bring them back to their normal capacity. Some motorists insist that the work be done over night or in 24 hours, and upon receiving the battery find that it is inefficient. Naturally, a complaint



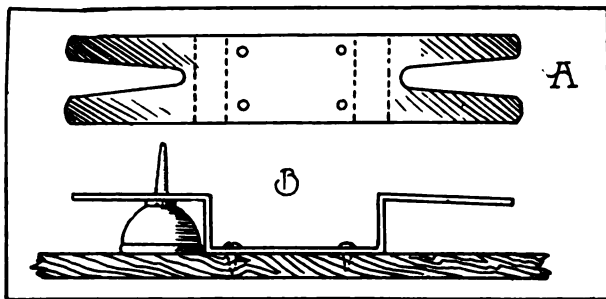
Easily Constructed and Convenient Receptacle for Storing Nuts, Bolts, Screws, Etc.

is made to the agent of the car or the battery maker.

It is recommended that an ampere meter be inserted in the circuit to ascertain how much current is being sent to the cells by the generator at a speed equalling about 15 miles an hour car speed. It is stated that the dynamo should be generating at least the lamp load at 15 miles an hour. If not the system should be inspected.

Proper maintenance of the storage battery does not involve much labor. Test the electrolyte in each cell at least once or twice a month with a hydrometer syringe, and if found to read below 1.250, drive the car a long distance at a good rate of speed or run the motor with the machine standing idle until the electrolyte readings show 1.275 to 1.300 in each cell. If this

treatment fails, the battery should be removed from the car and carried to the expert for a long charge as previously explained. It is cheaper to



Home Made Oil Can Holder: A, Construction of Retaining Strip; B, Can in Place.

hire a battery while the old one is being rejuvenated than to take chances of injuring it by use in an improper condition.

CARE OF PETCOCKS.

Petcocks in the fuel line rarely give trouble other than leaking. When this condition exists, it may be remedied by tightening the locking nut or screw, and if this fails to effect a cure the construction should be disassembled as it may need grinding. As brass is generally employed, powdered glass or any fine abrasive should be utilized.

An odd accident to a fuel petcock came to the attention of the writer recently. The machine was a Ford, which has the petcock in the fuel line approximately under the front seats. In traversing a road a stone was thrown up by the road wheel, striking the lever of the petcock and shutting off the supply of fuel. Consequently, the motor stopped, which bothered the driver to locate the cause. Fortunately, he remembered the striking of the stone, made an investigation, and found the petcock closed. By tightening the screw member, the loose part was made proof against a similar accident.

OIL CAN HOLDER.

The oil can and the container used for carrying gasoline or other fuel utilized for priming, are generally stored in the tool box or carried in some other place where time is lost when their use is desired. A simple, practical and easily made can holder is shown in an accompanying illustration, it being noted by the writer on a Ford car.

The holder proper is shown at A. This consists of a strip of heavy spring brass, although any metal of sufficient stiffness may be employed.

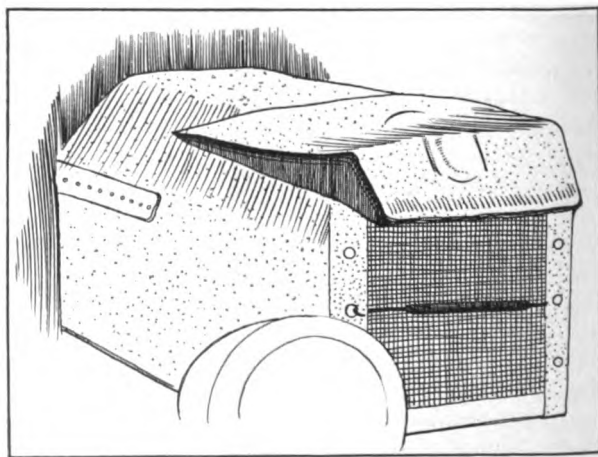
Two slots were cut as indicated, but in making these the diameter of the spout should be considered, although by tapering the slot the holder could be employed with the average can.

By bending the metal at the points indicated by the dotted lines at A to the shape shown at B, a can is retained by the pressure of the slotted portion, which should be sprung slightly downward, as shown as the right in the illustration. By drilling four holes and utilizing machine screws or small bolts and nuts, the construction is secured to the motor pan just in front of the carburetor.

The cans are easily slipped into and out of position, and when their use is desired, the hood is lifted. Being in proximity to the motor, the heat of the engine keeps the fluids warm. This is an advantage in cool weather as the oil will flow readily. When one can is utilized for gasoline, its vaporizing point is raised, provided the motor has not become entirely cold.

FORD HOOD COVER.

Many owners display considerable ingenuity in constructing useful accessories for their machines, although able to purchase ready made devices. In an accompanying illustration is shown a home made hood cover for a model T Ford car, which the owner considers superior to the marketed article in that it is easily attached, and he states that it keeps the motor warm for a longer period than the purchased design. One of the interesting facts in connection with the hood is that the padding is made from a comforter which he used when he was in college.



Hood Cover for Model T Ford Car Constructed by Owner.

The material utilized was a fairly heavy brown duck, and this was made to conform to the shape of the hood as shown in sketch. To

retain the cover in place and to prevent any movement, a coil spring was fitted as indicated. The flap lifts upward and when thrown back as illustrated remains in position without any fastening. This, the owner states, saves time when operating on days when the weather is too mild for running the car with the flap down, as the flap may be lowered quickly when the machine is to be left for any length of time. The owner employs the car in his business and frequently makes long stops.

FORD MAGNETO HINTS.

The Hoyt Electrical Instrument Works, Penacook, N. H., in its instructions for utilizing its magnetometer, a device which is employed to test the Ford flywheel magneto, and which is described elsewhere in this issue, calls attention to some of the troubles that may be experienced with the magneto and their remedies.

Among those named is the accumulation of dirt under the contact plug of the magneto, which reduces its output, consequently affecting the operation of the motor at low speeds. When cleaning the plug, care should be taken to remove any foreign particles that may be in the hole.

End play of the crankshaft, due to worn main bearings, is held to be the most common cause of magneto inefficiency. It permits the magnets to rotate at a greater distance from the stationary coils than originally intended. The remedy for this is either to put in new bearings or take up the end play in the old ones so that the proper relation will be maintained between the magnets and the stationary coils.

Sometimes, little particles of metal will lodge between the ribbon terminals of the coils, forming sufficient ground to cut off some of the coils, or, sometimes, the oil will become impregnated with fine metallic dust that will ground the coils. By cleaning the coils thoroughly and renewing the oil the trouble is easily remedied.

To test stationary coils, use four or six dry cells connected in series. Attach one terminal of the battery to the insulated plug in the top of the magneto and the other battery terminal to the connection where the last coil is grounded to the plate. Then, with a piece of soft iron, touch the iron core of each coil to see if there is a good "pull". If trouble is found to exist, try out the coils one at a time by touching the battery terminal on the terminal of the first coil and determining the "pull". Then on the second, repeating the operation until the grounded coil is located.

Relative to weak magnets: This trouble is not common. As they are liable to have cracks in them, and few repair shops have facilities for properly recharging them, it will be found, in the majority of cases, better economy to replace faulty ones with new, especially as the cost is not great.

MAGNETO SUGGESTION.

A repairman who has had considerable experience with magnetos makes the following suggestion: Examine the magneto from time to time to note if any of the screws, particularly those holding the magnets to the pole pieces, be loose. The constant vibration may loosen some of these, which should be kept tight to prevent foreign elements working into the instrument and impairing its efficiency.

ANNEALING WIRE.

It may happen that a piece of soft wire is needed to make a repair and the tool box contains only hard or spring wire. This may easily be made flexible by annealing. The process is simple. Hold the wire in a naked flame until it becomes red hot, then allow it to cool gradually.

KEROSENE ON WORLD TRIP.

Kohl Now Touring the Holy Land—Saves Much Money by Shunning Gasoline.

According to information received March 1, from Edward P. Kohl, the University of Wisconsin student, who is enjoying a world tour in a Henderson car, made by the Henderson Motor Car Company, Indianapolis, Ind., the party is now in the Holy Land, having left Egypt a few days previous to that time. The car is fitted with a Harroun carburetor, produced by the Harroun Company, also of Indianapolis, and burns kerosene. The entire trip has been covered with kerosene as fuel.

Kohl left Indianapolis in August, and in a letter mailed from Vienna, he stated that he was saving about \$10 every time his 40-gallon fuel tank was filled. At that time he had visited the British Isles, Germany, France, Holland, Russia and Austria, in which countries he found that the price of gasoline varied from 40 to 60 cents a gallon, while he was able to purchase kerosene for about 16 cents.

It may be added that the machine is fitted with an Eisemann magneto, made by the Eisemann Magneto Company, New York City.



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SAFETY FIRST.

While it is absolutely true that the automobile is nowhere near so dangerous as the publication of statistics would seem to imply, there is abundant reason why automobile accidents should be much less frequent. The compilation of these statistics has been impelled by the apparent increase in the number of reckless drivers, although, as a matter of fact, the percentage of those who operate their machines without due regard for the rights of other users of the highways is exceedingly small.

The reckless driver is a distinct menace. Not only does he endanger the lives of other highway users—pedestrians, occupants of horse drawn vehicles and the vast majority of law abiding motorists—but his existence is harmful to the industry. Much of the drastic legislation

which has been enacted and many of the bills proposed each year have their inception in an attempt to curb this small minority. And, despite the accumulation of laws, their ineffectual administration tends to cause greater hardship upon those who honestly seek to avoid accident, without any appreciable effect upon the real offenders.

Public opinion is a valuable asset. Societies have been organized for the purpose of influencing public opinion in a manner not calculated to benefit the automobile industry. That organized motorists have seen fit to meet this agitation in a practical manner is worthy of special commendation. The "Safety First" campaign, now in process of inauguration, is one which should, and undoubtedly will, receive the heartiest co-operation by manufacturers, dealers and owners. It is a movement which will mean much to the industry as a whole, and once the foundation has been laid, it ought to be less difficult to secure the proper enforcement of such legislation as has reached the statute books, when it will be found that the need for additional regulation is at least open to question.

THE CALIFORNIA DECISION.

The position taken by the California supreme court, as set forth elsewhere in this issue, is somewhat new. United States courts have held that when the fee is made larger than is sufficient to meet the expense of administering the law, it becomes a tax. Other state courts, notably in Mississippi and Ohio, have decided against the constitutionality of laws having provisions similar to those of the California statute, and on the ground that the fees thus provided took the form of a tax.

It is of interest in this connection to note the opinion made public by Sidney P. Osborn, secretary of state for Arizona, in which he holds that the law requiring the registration of motor vehicles in that commonwealth is manifestly unconstitutional, because the fees result in the collection of far more money than is necessary to administer the law, and, therefore, in double taxation. The new California law makes no provision for exempting automobiles from taxation in other ways, and it would seem that the supreme court would have had little trouble in discovering that double taxation existed.

GRAY & DAVIS FACTORY A MODEL PLANT.

Has Three Acres of Floor Space, Employs 600 Men and Manufactures Over 300 Systems a Day--Well Ventilated, and Sanitary Conditions Are Excellent.

SOME idea of the remarkable growth of the electric lighting and motor starting industry may be obtained from the statement that the new factory of Gray & Davis, Inc., Cambridge, Mass., averages an output of 320 systems each working day, or approximately 100,000 a year. Such a large production not only requires the latest manufacturing facilities, but the machinery and departments must be so arranged that the minimum of time is wasted in converting the raw material into a finished product.

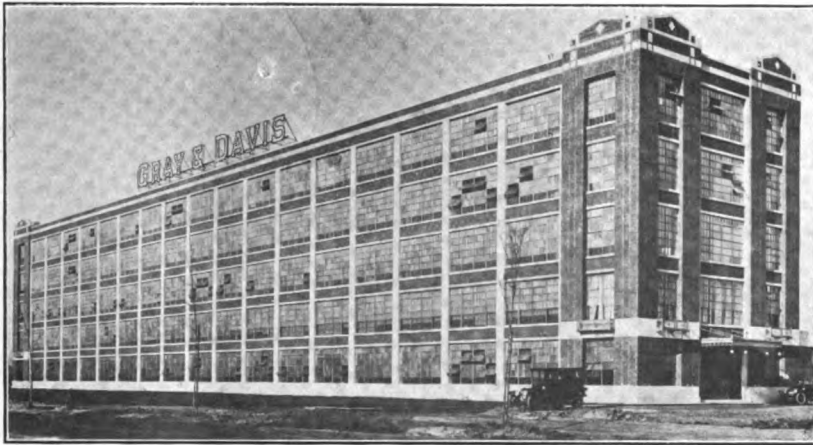
The present magnitude of the Gray & Davis business is due to the executive ability of President William Gray. His policy of perfecting an article and incorporating only the best of material and workmanship, or in other words, maintaining a high standard, has made Gray & Davis a leading manufacturer of lighting and motor starting equipment. In the construction of the new factory no detail was too small for Mr. Gray's attention. As a result the new plant is not only a beautiful structure, but one of the finest business buildings in the country.

The plant itself occupies the centre of a spacious plot facing the Charles river, between which and the factory is 150 feet of lawn and parkway. The main building is 381 feet six inches in length, with a width of 81 feet for the first story and 61 for the other four. The total floor area is nearly 140,000 square feet, or approximately three acres. There is an ell in the rear, 36 by 62 feet, this running through the full height of the building and containing the elevator tower, stair tower, tool, store, locker and wash rooms. For the last three uses mezzanine floors are interposed above the first floor. This

portion of the structure is framed in steel.

The material employed is reinforced concrete. The ornamental end bays are faced with brick, while the sub-structure is concrete. Those portions of the wall between the pilasters which are not occupied with the steel sash windows are of concrete panelled with tapestry brick. There is no basement. The main floor is laid directly upon the fill without the use of forms, and is practically a part of the ground. The piers were carried down to a solid footing at a depth of 12 feet. All of the columns are cylindrical, with mushroom tops, giving a particularly effective appearance, as well as providing maximum strength. The columns are of reinforced concrete, whereas the piers below them, being supported by the

hard fill and thus subject to compression only, are plain concrete without steel reinforcement. The wall columns are rectangular in section, carrying under each floor a corbel for giving the floor slab that local support which it receives from the mushroom

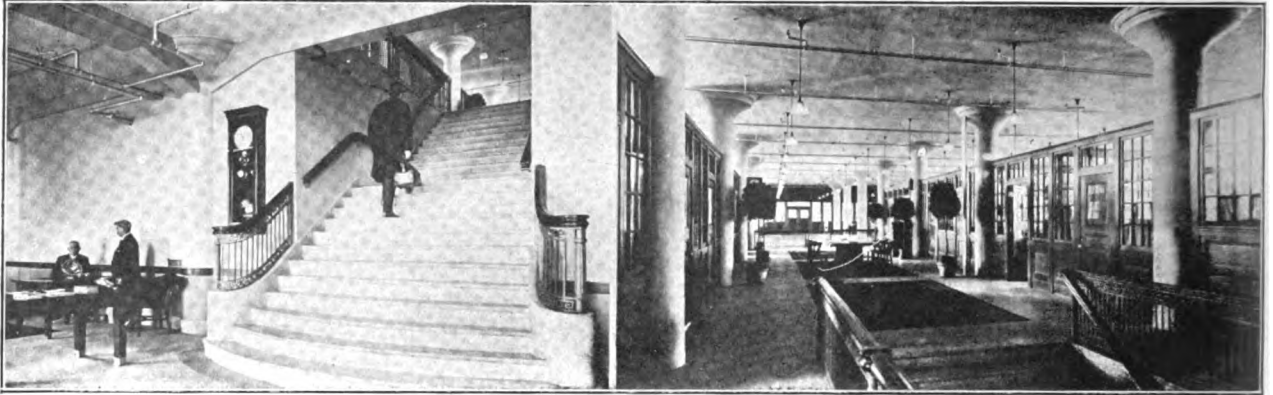


New Gray & Davis Factory, Having a Total Floor Space of 140,000 Square Feet, and Utilized Exclusively for the Manufacture of Electric Lighting and Motor Starting Systems.

heads of the interior columns mentioned.

All floors above the first are 8.5 inches thick, these slabs measuring 20 feet square to the centres of the columns and being built without beams or girders of any kind. The top layer is about one inch of granolithic finish, which was laid some time after the structure of the floor. The large open space provided by the wide spacing of the columns makes it possible to locate machinery almost without regard to interference from this source.

Between wall columns a reinforced concrete beam, 36 by eight inches, was cast in each bay. This is cast into slots left in the pilasters, thus making an expansion joint at each end of the



At Left, Stairway and Entrances to the Offices from the Lobby; at Right, Corridor of Main Offices from Entrance.

beam, a thoughtful provision against the opening of disconcerting fissures in the attractive tapestry brick exterior. These beams form a portion of the outside wall of the building. As the lower edge of the beam is in the same plane as the ceiling, it will be noted that this beam extends well above the floor level and that the floor is dependent from it. By this means the windows are run clear up to the ceiling level and an absolute maximum of lighting is obtained. The window area is 70 per cent. of the entire wall area.

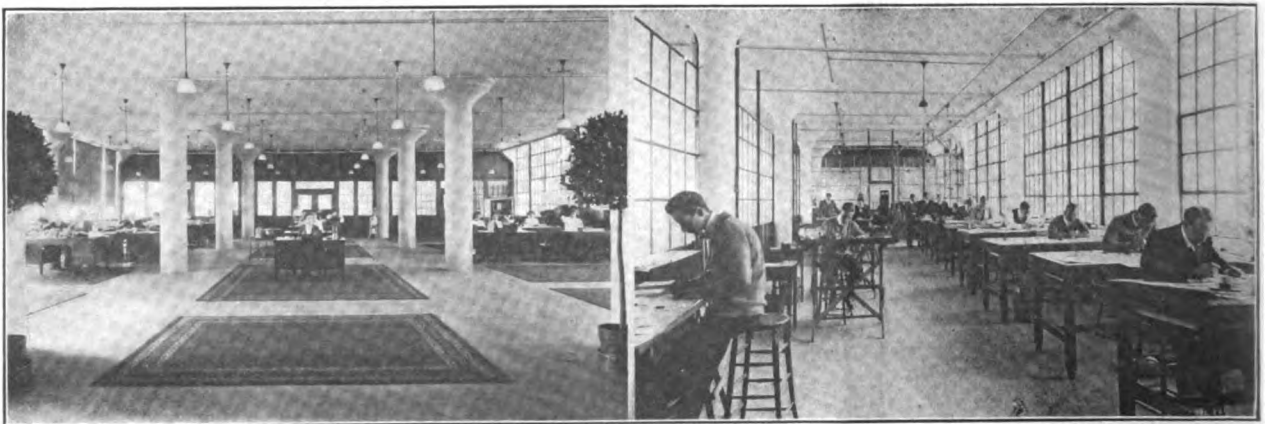
Large Window Area.

Steel sash is utilized throughout, in each case so arranged that 33 per cent. of the window area is adjustable for ventilation. In the case of the executive office, on the second floor, the operating portion of the sash is double hung, so that it may be handled as ordinary windows. In the manufacturing part of the building each ventilating sash is pivoted at the centre. The area available for ventilation thus figures out 21 per cent. of the entire wall area of the building. Natural ventilation alone is provided by large num-

ber of windows, no blower system being needed.

All pipe sleeves are arranged through the different floors. Instead of using a tin sleeve or one of galvanized iron, wrought iron pipe has been utilized in every case. These have been left three inches high above the floor as a precaution against leakage of water into a lower floor at any time when water may lie upon an operating floor, from the breakage of a sprinkler, from water thrown on a fire, or from washing down a floor, for example.

All conduits for electric service, including lighting and power, are concealed in the floors. This eliminates loose wiring and conduces toward appearance and freedom from trouble. Power outlets, with suitable plugs, are located in both ceilings and floors at convenient intervals, so that power will be available for any machine within easy distance and with a minimum of trouble. A somewhat similar arrangement is the location of inserts in the concrete, four feet apart in both directions over the entire area of the ceilings in the manufacturing department. This makes it possible to attach shaft hangers or



At Left, View Down Corridor of the General Offices, Indicating Large Lighting Area; at Right, Draughting Room.



At Left, General View of the Heavy Machine Shop; Centre, One of the Banks of Drills; Right, Heat Treating Room.

other pendent devices at any place where they may be needed.

The system of heating is very ingenious, it being stated that there are but two other plants utilizing the method. The unusual window area made it necessary to use a large amount of radiation surface for heating, and to have provided this in the form of coils and radiators along the walls would have involved a great many large units. It was decided, therefore, to use the sprinkler piping in the ceiling as an auxiliary heating surface. This, of course, necessitated the use of hot water as a heating medium, with its ready control and adaptability to changing climatic conditions.

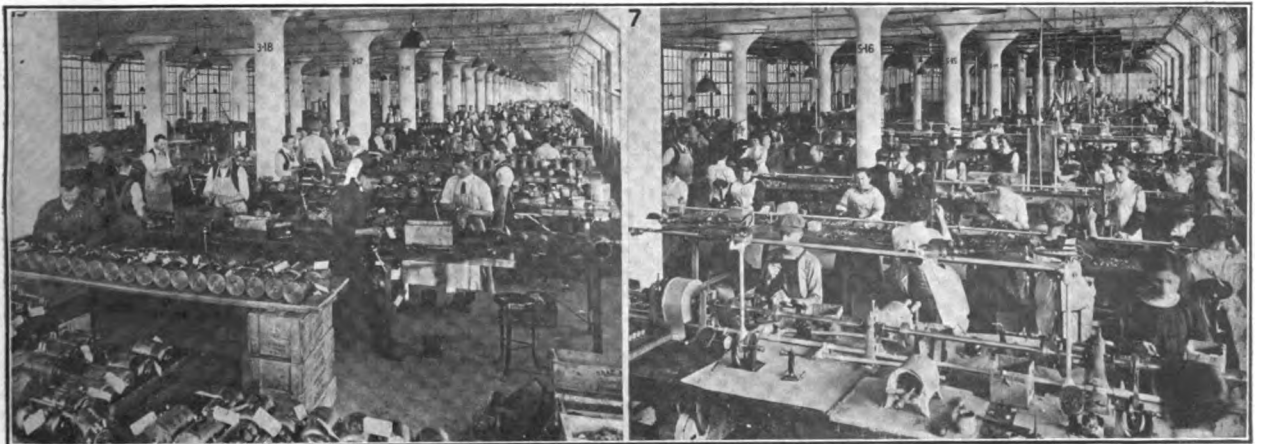
To guard the sprinkler heads or to prevent fusing, they were placed on offsets about a foot long. The water in these offsets is, of course, not in circulation, whereas the system of piping is so arranged that continuous circulation is kept up from the riser on one side of the building to the return on the other in each of several sections. In this way the distribution of heat is kept uniform all over the building, while at the same

time the pipes, being continually traversed by moving water, cannot become clogged in any place.

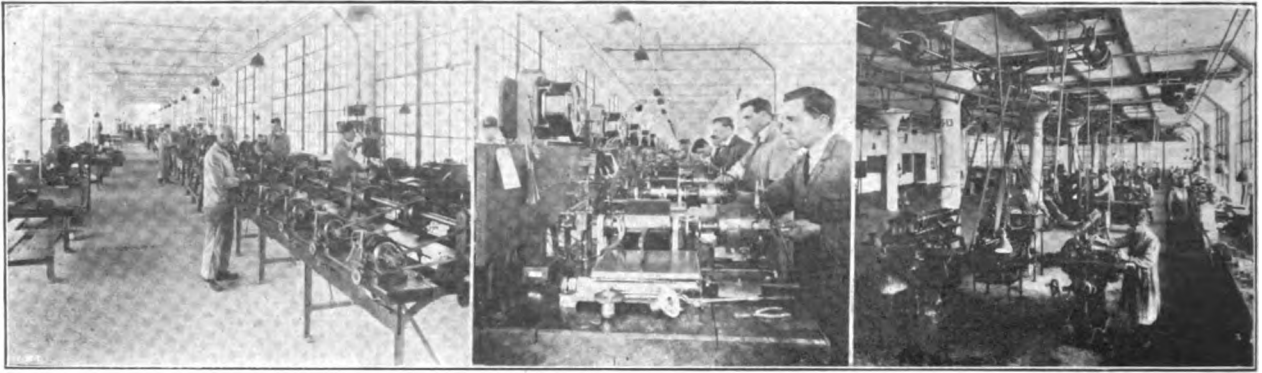
Ready Delivery of Material.

The stock, store and toolrooms, located near the centre of the east wall on each floor, are in the same ell in which are located the elevator and stairs, and hence are ready of access for the delivery of material. In working out the locker rooms, it has already been mentioned that structural steel was used as a frame work. In order that the columns might not interfere in any way with the free use of the locker rooms, it was arranged to use small columns, each made of two steel angles back to back, these being located in each case at the end of a row of lockers where they are completely out of the way and do not block the alley space. This provides a somewhat narrower column and beam spacing than might otherwise have been chosen, but worked very well with small I beams as the basis for the floor structure.

The offices are handsomely finished. The partitions are solid mahogany and glass, reach-



At Left, Finishing Motors, Also Showing Method of Numbering Floors and Bays; Right, Small Parts Department.



At Left, Testing Department; Generators Being Subjected to a Duration Test; Centre, Testing Starting Motors; at Right, Tool Department in Which All Tools and Jigs Are Made.

ing a height of about eight feet above the floor. The windows in this section are double hung, as previously referred to. The radiators are of a very pleasing design, taking the place of the coils of piping in the factory. The furniture, which was especially manufactured, matches the partitions and decorations.

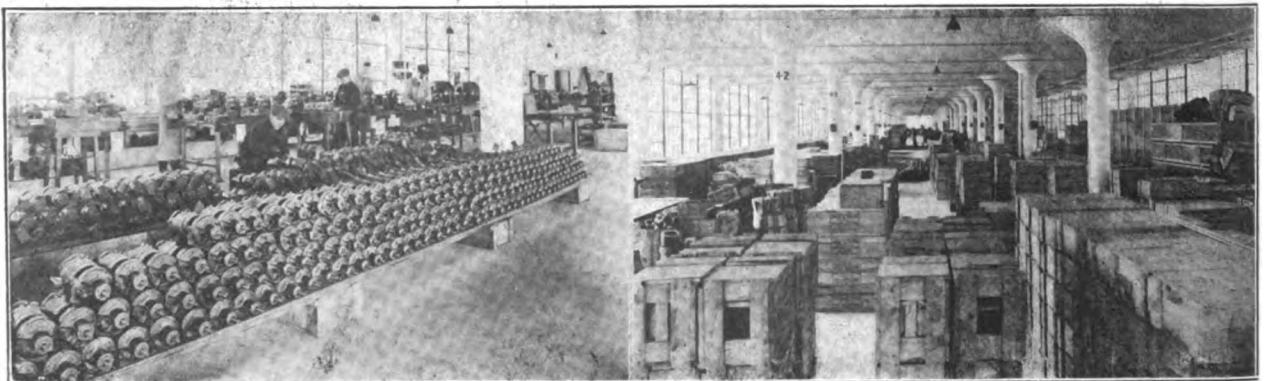
Luxurious Offices.

Mr. Gray's office and the directors' room adjoining, have large open fire places, and the floors are laid in red tile, covered by rugs. The windows are screened by silk velour curtains and all of the appointments are in keeping with the luxurious surroundings. The lobby on the first floor opens directly upon a broad staircase with easy flight, which lands near the centre of the offices, and permits ready access to all parts. On the first floor is the retail sales department. Back of the private offices and separated from the main corridor by a wrought iron rail, the general office, occupied by clerks and stenographers, covers the entire width of the building. The broad corridor, running down the centre from the head of the staircase to the door leading into the manufacturing department, and limited by glass and mahogany partitions on either

side, passes on through the general office, but without partitions, the location of the desks serving as a general outline to its course.

At the four corners of the main building wrought iron balconies have been added to the second floor as ornamentation. Painted a bronze green, they add a touch of color which blends with the gray of the concrete and the mottled red and purple of the tapestry brick. The marquise has the same color scheme as the balconies and adds a further touch of ornateness to the east end of the structure.

The routine of the factory consists of six main operations, receiving, machining, stocking, assembling, testing and shipping. All material, including office supplies, etc., passes through a door at one end and a record is made. The entire ground floor is utilized for machining, milling, grinding, drilling, etc. The machined parts go to the next floor, where they are stocked in steel trays arranged in numbered racks and entered in a card index, from which can be quickly ascertained the exact quantity in stock. In filling orders the required parts are withdrawn from the stockroom and sent to the assembling department. The system used is excellent.



At Left, Dynamoes After Being Tested and Ready for Assembling; at Right, Shipping Department.

The finished material, such as motors and generators, is then passed to the testing department, where individual, duration and abusive tests are made, the results being so recorded that permanent data are always available. Having met all requirements the machines are returned to the ground floor and shipped directly to the railroad siding.

Location of Departments.

The machine shop on the first floor occupies the full length of the building with the exception of the lobby at one end. The machines are arranged in banks, the gear cutters and shapers, automatics, turret and chuck lathes being at one end and the grinding, stamping and buffing at the other. The second floor is divided, the stock-room occupying one-half and the offices the other portion. On the third floor is the testing department. All dynamos are run in for several hours on a long bench and at constant speed. The output, etc., is entered on record cards attached to each machine, and these cards are filed. The motors are subjected to severe tests. Assembling is done on this floor, the work immediately preceding the testing. The fifth or top floor is divided into four main sections, tool making and winding shop, experimental laboratories with engineers' offices, drawing room and restaurant. The tool department is adjacent to the elevator and as the tool supply on each floor is in the rear tower containing the elevator, tools can be transferred quickly from or to any floor. Jigs are used wherever possible.

Columns Numbered.

Throughout the plant all columns are numbered to indicate the position of the machines. Thus 5-13 indicates the fifth floor and the 13th bay. A similar method of numbering the stock-rooms bays is utilized. Each rack is numbered and the shelves carry a letter. The wood trays employed to accommodate the parts in the process of manufacture are all made in the carpenter shop.

Owing to the rather isolated situation of the plant the restaurant is popular with the employees. It has a seating capacity for 80 persons, but its uses extend much further. Orders can be received from any floor by telephone and at lunch time food is sent down by the elevator.

Two boilers are utilized, one supplying the hot water, the other furnishing steam for cleaning jets in the factory and also for the restaurant. All lavatories, toilets and cloak rooms are located in the rear extension, which has intermediate floors, providing the necessary area. The rack and separate coat hanger method is employed, it being thought more sanitary than the

individual locker. The toilets are separate from the cloak room, so that the latter may be locked during working hours. Entrance can only be made by application to the foreman of the room for the key.

Protection for Employees.

Large wash rooms are provided on every floor. A hospital provided with equipment for dealing with any accident is on the fourth floor and a qualified physician is always in attendance. In addition a bed is maintained in the Boston City Hospital. Opportunity for accident has been reduced to a minimum, rails being provided at dangerous points and all pulleys about machines are guarded. About 600 men are constantly employed.

The Gray & Davis factory is looked upon as a show building and visitors are cordially welcomed and shown through the plant by a competent guide.

BOSCH RACING VICTORIES.

Magnetos and Plugs of This Make Play Prominent Part in California Events.

Because of the late arrival of information concerning the running of the Vanderbilt Cup and Grand Prize races in California, last month, little space was available in the last issue for calling attention to the good work accomplished by the accessories fitted to the winning machines.

The Bosch Magneto Company, New York City, represented in Boston as New England distributor by the Motor Parts Company, 187 Columbus avenue, is calling attention to adverse conditions under which the complete ignition performs its functions when fitted to machines taking part in races of this character. The high speed, terrific external heat and excessive vibration are extremely trying upon the magneto, but the spark plugs have even more trying conditions to contend with, for they must withstand the excessive heat generated within the cylinder walls! meet the varying degrees of pressure created by the action of the pistons, withstand the overdose of oil continually administered, and with all this, give a clear path for the intense spark of the high-tension magneto.

It is significant that the drivers competing in the races named selected Bosch magnetos in all cases and Bosch plugs in nearly all. Since De Palma in a Mercedes created a new record for the Vanderbilt Cup event, and Pullen in a Mercer for the Grand Prize, Bosch magnetos and plugs also share in these record breaking performances.

WITH THE MOTORING INTERESTS ABROAD.

Well Known British Engineer Explains Interesting Phenomenon Respecting the Movement of Pistons—Features of South African Regulations—Other News.

MOTORISTS generally undoubtedly will be interested in the explanation of a most interesting and peculiar phenomenon in connection with the periodic movement of pistons, which was made in the Autocar, a British motoring publication, recently, as the result of an inquiry raised by one of its readers. The correspondence in question is reproduced herewith, as well as the diagrams utilized in explaining the point.

Eric W. Walford, a prominent English automobile engineer, was discussing the subject of "Lighter Pistons", a contribution purely techni-

clearly brought out by the following communication:

I do try to follow the experts in their expositions upon various phases of the internal combustion engine as admitted to your pages, but confess to being absolutely fogged by Eric W. Walford in his article upon "Lighter Pistons", in last week's issue. He bases a most important argument upon the statements:

"The piston travels faster during the top half of the revolution of the crank pin than during the lower", and, "the ascending piston is further from the mid-position than the descending piston is."

If Mr. Walford's engine had stopped at the position shown by the dotted lines in the diagram, and the crankshaft were reversed by hand, so that the ascending piston became the descending one, it would have less distance to go to get back to its original starting point than it covered in getting away from it!

I am also completely puzzled as to how the piston can travel faster during the top half of the revolution of the crankpin than during the lower.

The movements of the pistons being controlled by the movements of the crankpins, how can their speeds differ? And, if I suddenly turned the engine upside down, then it ought to have an immediate effect upon the relative speed of the two pistons! MYSTIFIED.

In making reply to this communication, Mr. Walford utilized the drawing at the right of the sketch to illustrate the point as still further amplified. A little study of this reply, in connection with the diagram, should enable the reader to understand the existence of the phenomenon, even if he is unable to explain the reason therefor. Mr. Walford's explanation follows:

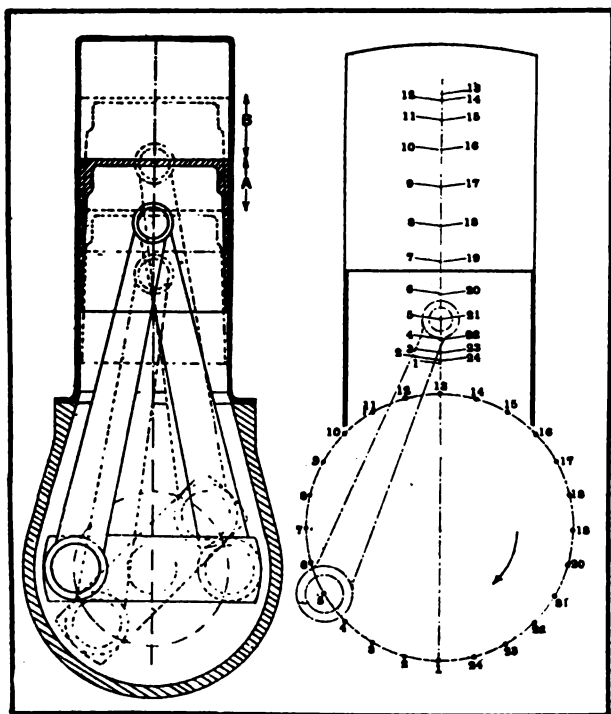
One can understand your correspondent not quite comprehending the periodic movement of the piston from the brief reference to the matter in my article in the Autocar, as it really requires a special diagram to make the point clear, and such a diagram was not merited by the subject of the article.

I was briefly referring to a point which is well known to experienced engineers, and will probably be comprehensible to most people with a fair amount of technical knowledge. To the lay reader, however, the point may be of somewhat difficult comprehension, but I suggest to your correspondent that he should cut strips of cardboard and gum two pieces parallel to one another on a board so as to represent the cylinder walls. Sliding between these must be a square piece of card to correspond to a piston, and a crank and connecting rod can be added, being joined together by paper fasteners, pins, or eyelets. The shorter the connecting rod is made the more pronounced will be the result.

Mark a circle on the table to correspond to the path of the crankpin, and divide this into 24 equal parts. Then start at the bottom dead centre and move the crank pin to the first mark, i. e., a 24th of a revolution, 15 degrees, then mark the point to which the piston has ascended, and so on through the whole travel of the piston, so that one gets 24 positions, somewhat as shown in the accompanying diagram. Your correspondent will then see that the spaces between these marks do not increase equally to the maximum and then decrease.

Briefly, it may be stated that, as the piston moves towards the crankshaft, it travels farther during the first 30 degrees of crank rotation than during the last 30 degrees.

On the accompanying diagram the crank obviously moves through the same angle from points 1 to 4 as it



Diagrams Illustrating Interesting Phenomenon: At Left, Ascending Piston Is Further from Mid-Position Than Descending Piston; at Right, Various Positions Plotted to Still Further Bring Out the Point.

cal in character, during which he called attention to the diagram at the left in the accompanying sketch, which was drawn to cover other points than that which was raised. It shows two pistons and cranks in exactly the same horizontal plane, and Mr. Walford made the point that when the crankpins are in an intermediate position, as indicated by the dotted lines, the ascending piston is further from the mid-position than the descending one. The point raised is very

does from 13 to 16. On the other hand, if one compares the distance from 1 to 4 with that from 13 to 16 on the vertical line, the greater length of the latter is at once apparent. Of course, whether the engine is upside down or not the effect is just the same. A little experimenting with a cardboard model will make this point quite clear, although at first it seems a paradox.

ERIC W. WALFORD.

CLUSTER SEATING ARRANGEMENT.

Ingenious Method Evolved by Australian Designer for Carrying Four in a Roadster.

As has been indicated to some length recently in these columns, foreign coach makers are prone to devote no little attention to the production of motor car bodies which may be considered out of the ordinary, to say the least. Often these designs are held to be the result of an attempt to secure something which possesses particular artistic merit. In the accompanying illustration, however, is presented the result of efforts on the part of an Australian designer to produce economy, in that it is maintained that the body shown can be constructed at the same cost as an ordinary two-seater.

It may be added, in this connection, that several European designers have produced three-seated bodies for so-called cycle-cars or light cars, which include some of the features presented in this design. One of these was exhibited recently in the Importers' Salon at the Hotel Astor in New York City, fitted to a Bugatti chassis.

In addition to the low first cost effected by the design presented herewith, it is maintained that easier riding qualities are produced, since the rear passengers are located further forward than usual with four-seated bodies. The width of the body does not exceed that of the ordinary roadster.

SOUTH AFRICAN LEGISLATION.

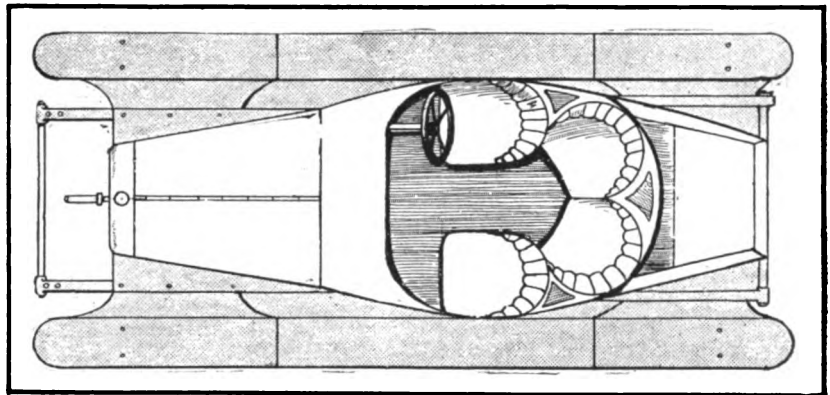
Motoring Laws in Four Provinces Indicate Important Growth in Use of Cars.

Because of the numerous American automobiles, both passenger and commercial vehicles, which have been sold in South Africa, it will prove of interest to note that motoring laws recently enacted went into force in the provinces of Cape Colony, Transvaal, Natal and Orange Free State, Jan. 1. It would seem that the ex-

perience of other nations in handling this difficult subject would have made it possible for the provincial councils involved to have enacted uniform ordinances covering this matter, but it will be seen that such was not the case.

In all four provinces it is required that both cars and drivers shall be licensed. With respect to the latter, the applicant must submit to an examination as to car control and observance of the usual traffic rules. Wherever possible, it is provided that the examining board shall include one member or more from a recognized automobile club. The driver's license in Cape Colony and Orange Free State is 20 shillings; in the Transvaal, 10 shillings, and in Natal, not exceeding 10 shillings. In the last named instance the exact amount is yet to be fixed by borough by-law.

In Orange Free State the car license is perpetual at 40 shillings a car, irrespective of size or horsepower. In Natal, the amount must not ex-



Example of Cluster Seating Arrangement Devised by Australian Designer for Accommodating Four Passengers in a Roadster.

ceed £3 a car, the exact amount to be fixed by the same authority as that of the driver's license, and this must be paid annually. In Cape Colony there is a sliding scale, with annual fees, as follows: Cars weighing 1500 pounds and under, 30 shillings; 1500-2500 pounds, 40s; 2500-4000 pounds, 60s; 4000-6000 pounds, 100s; over 6000 pounds, £10. In Transvaal there is a basic charge of £2 a car, annually, plus one shilling a horsepower and two shillings for each 100 pounds in weight.

Provision also has been made for licensing dealers and manufacturers, although there are none of the latter as yet, in Cape Colony, Transvaal and Orange Free State, the annual fee being £10. In Natal the dealer's license fee must not exceed £3. It may be added that these fees are in addition to the regular license fee common to all traders in the country. In consideration of this extra fee, the dealer is permitted to operate

cars in trial for prospective purchasers, the period during which any one car may be so run in the Transvaal being one month.

The provisions for touring would appear to be about the same as in the United States. Cars registered in the other provinces may be operated in Natal without further registration. In Cape Colony and Transvaal, such licenses are good for three months in any one calendar year, and in Orange Free State, for a continuous period of one month. No provision is made for cars owned outside the Union of South Africa.

The Transvaal ordinance has no speed limit, except in special circumstances or within certain defined areas, and permits the motorist to drive with due regard for the nature, condition and use of the road, and to the amount of traffic which is actually thereon at the time. The Cape Colony and Natal laws have a maximum speed limit of 30 miles an hour, and Orange Free State, of 20.

There are a number of other provisions, of course, particularly with reference to commercial vehicles, these having to do with the weight permitted to each inch of tire width, use of trailers, etc. In the main, however, the constructional details demanded for pleasure cars do not differ materially from those required elsewhere. In each province the funds are to be devoted to the construction and maintenance of roads.

GRAND PRIX ENTRANTS.

Thirty-Nine Cars Will Represent Six Nations in French Event July 4.

Entries at the original fee for the French Grand Prix closed last month, and it is found that 14 manufacturers, in six countries, are to be represented by 39 cars. Additional machines may be listed at double fees until March 31. The race will be held July 4, over the Circuit de Lyons, a 23.5-mile course, which will be covered 20 times, making a total distance of approximately 470 miles. The entrants comprise the following, listed as to country, number, make of machine and driver:

French—1, Alda, Tabuteau; 2, Peugeot, Boillot; 3, Peugeot, Goux; 4, Peugeot, Rigal; 18, Alda, unnamed; 24, Alda, unnamed; 28, Th. Schneider, Champoiseau; 29, Th. Schneider, Croquet; 30, Th. Schneider, Gabriel; 31, Delage, Babirot; 32, Delage, Guyot; 33, Delage, Thomas.

Italian—8, Nazzaro, Nazzaro; 17, Caesar, unnamed; 19, Aquila-Italiana, Marsaglia; 20, Aquila-Italiana, d'Argentina; 21, Aquila-Italiana, unnamed; 34, Nazzaro, unnamed; 37, Fiat, Wagner; 38, Fiat, Cagno; 39, Fiat, unnamed.

German—9, Opel, Joerns; 10, Opel, unnamed; 11, Opel, unnamed; 12, Mercedes, Lautenschlager; 13, Mercedes, Pilette; 14, Mercedes, Salzer; 15, Mercedes, Nagel; 16, Mercedes, Seller.

English—5, Sunbeam, Resta; 6, Sunbeam, Chassagne;

7, Sunbeam, Lee Guinness; 25, Vauxhall, unnamed; 26, Vauxhall, unnamed; 27, Vauxhall, unnamed.

Swiss—35, Picard-Pictet, unnamed; 36, Picard-Pictet, unnamed.

Belgian—22, Nagant, unnamed; 23, Nagant, unnamed.

MORE BRITISH RECORDS.

Bentley in a D. F. P. Secures Marks in Class B, Lower Than American Figures.

While it is not exactly proper to compare the records made under the British class B with those of the lowest classification in America, 160 cubic inches and under, it is true that W. O. Bentley recently secured records on Brooklands track, Weybridge, England, which are lower than the speedway marks held in this country by cars of the above classification. The maximum piston displacement permitted under the British class B is 2048 cc (about 125 cubic inches).

Bentley covered a half-mile in 20.07, a kilometer in 25.06, one mile in 41.05, two miles in 1:23.41, five miles in 3:33.13 and 10 miles in 7:07.09. The best records in this country, corresponding in any measure to these, were made by Frank Witt in a Flanders in the 160 cubic inches class at Indianapolis, Nov. 13, 1911, when he drove a mile in 56.80, and five miles in 4:22.08, and by Robert Evans in a Flanders at the same place the same day, when he drove 10 miles in 8:53.97.

NEWS NOTES FROM ABROAD.

The first automobile tour in Morocco took place recently, when 11 machines started from Casablanca. Part of the trip was over the plain of Ben Guerir, where only a year ago Col. Mangin fought a hard battle, while marching on Marrakech.

A special competition of four-wheel drive tractors for military purposes was begun before French army officials, March 2, and will be continued until March 20. At the completion of the tests the vehicles will be entirely dismantled at the artillery shops in Vincennes.

It has definitely been decided to hold the 1914 Tourist Trophy race on the Isle of Man, June 10-11. The Royal Automobile Club of Great Britain also has decided to hold a light car race over the same course in May. This event will be limited to cars that have piston displacement of 1400 cc (approximately 85 cubic inches).

The Warsaw Automobile Club, Warsaw, Poland, is organizing a reliability trial for June 26-29, to determine the type of car best suited to the Polish roads. The total distance covered will be about 1139.5 versts (about 755 miles), all on metal roads, with the exception of about 38 versts (25 miles). The event will be international in character and entries will be received until May 25, addressed to Tow, Automobilistow, Krolewstwa Polskiego, 6, Czysza, Warsaw.

In connection with the use of the international touring pass in Russia, it is explained that the pass is not inspected either at the customs office or by the police, but it is the duty of the owner to take his car and pass to the police office for registration, stating what towns he wishes to visit. The police then notify every police office in the districts to be traversed, and nothing further need be done for six months. There is no charge for this registration, but failure to observe the formalities makes the owner liable to a fine for driving an unregistered car and subjects him to the necessity for taking out a Russian license.

CORRESPONDENCE WITH THE READER.

QUESTIONS ACKNOWLEDGED AND ANSWERED BY MAIL.

G. H. McCarthy, New York City, Metz Car.
 L. H. C., Hyman, S. C., Overland Model 51.
 J. H. P., Fall River, Mass., Spark Tester.
 F. G. H., East Cambridge, Mass., Platon Rings.
 G. F. C., Madison, Conn., Gas Generator.
 R. M. A., La Grange, Ga., Motors.

Ed. Note—The correspondence columns are open to all readers of The Automobile Journal and the trade. Names of contributors will not be published if so requested, and when desired questions will be answered by mail. When the information is of an educational nature the editor of this department reserves the right to publish the question, but will make use only of the initials of the writer.

Cadillac Clutch—Young Reader, Lawrence, Mass.

Please give me complete information concerning the lining of the leather faced cone clutch such as used on the Cadillac.

If it be necessary to reface the clutch its removal from the car will be necessary. While the model of the machine was not given, the writer believes that the drawing at Fig. 2, which illustrates the components of the 1912 Cadillac, will be of service in dismantling clutch mechanism.

To remove the main clutch and universal joint, displace the pedal shaft E, the eight screws F F, and close together the sleeves G and H. The joint is then removable. Next displace nuts C C and the springs B, which will permit of taking out the clutch disc. The clutch bushing may be withdrawn by removing the cap L, cotter pin M, and the right hand threaded nut N. In reassembling the clutch, turn the nut N by hand until it brings up lightly, then back it off until the cotter pin can be inserted.

If the old facing can be removed without breaking it up, it may be utilized as a pattern for a new one. To make a pattern take a large sheet of paper and lay out the clutch to exact size, making sure that faces are at proper angle.

At Fig. 1 is a diagram for determining the size of the new clutch leather. Draw a line through the centre of the hub and parallel with it, this being represented by the line A-B in the drawing. Continue the angle of the cone by straight lines meeting at a point in the centre line. Then using this point as a centre and the distances from B to C and B to D as radii, describe the circles E G and F H. The distance from E to G must equal the largest circumference of the cone so the ends will butt together, or it may be advisable to make the strip a little longer than necessary and allow for fitting. The pattern thus obtained may be used to cut the new leather.

Before riveting in place the leather should be made as pliable as possible with oil, although there exists some difference of opinion among repairmen regarding this practise. Some advocate soaking it in water and applying it wet, so that when it dries it will shrink and hug the cone closer, while others apply it dry and oil it after it is placed. In the opinion of the writer the water method is likely to result in the leather pulling away from the rivets, while oiling the material after application is apt to cause expansion and an uneven surface. When the leather is oiled before application it is soft, elastic and pliable, and if properly fitted there will be no trouble in the material becoming loose or so closely engaged that it will burst from its fastenings.

There is also a difference of opinion as to fit-

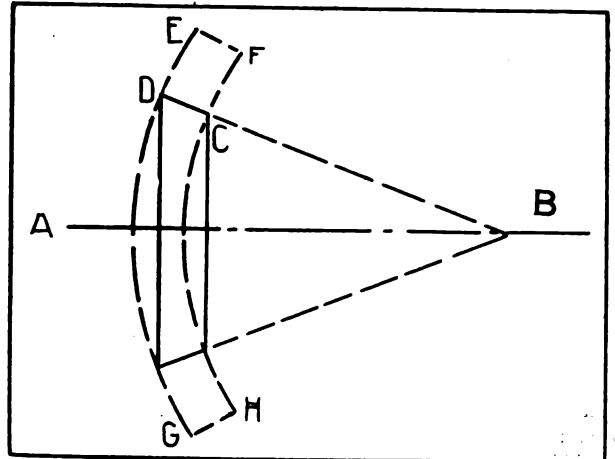


Fig. 1—Method of Making a Pattern or Determining Size of New Clutch Leather.

ting the leather. A good method, however, is to place the leather in position at one end and hold it with small clamps. The holes are then drilled and the leather riveted in place, care being taken that the holes for the rivet heads are countersunk deep enough so that the metal will be well below the surface of the leather. After the end is securely fastened the leather is pulled tightly around the cone to the next point of fastening, the facing being stretched by a clamp, the holes drilled and the rivets applied, the operation being repeated from one point of attachment on the outer circumference of the cone to the next. This method of fitting the facing insures that it will hug the cone closely, instead of standing away between the rivets, as is the case when all holes are drilled in the leather at the same time.

When the facing is applied it should be trued in a lathe by taking a light cut off the surface,

or the high spots may be rubbed off by hand with sandpaper, a piece of glass or a coarse file. The best material for cone facing is good oak bark tanned sole leather or belting, though hemlock tanned is often used with good results. The former material possesses most of the qualities of elasticity, durability and the degree of friction adhesion required. The maker of the Cadillac recommends the use of neatsfoot oil only and the use of it sparingly.

The clutch will have to be adjusted after replacement. To determine if the main member A (Fig. 2) seats properly, grasp the clutch pedal, and if it can be moved back and forth approximately an inch or more with the application of moderate pressure and without starting to release the clutch, it may be assumed to be correct.

Sometimes the failure of the clutch to seat firmly is due to the stay rod D, and it may be

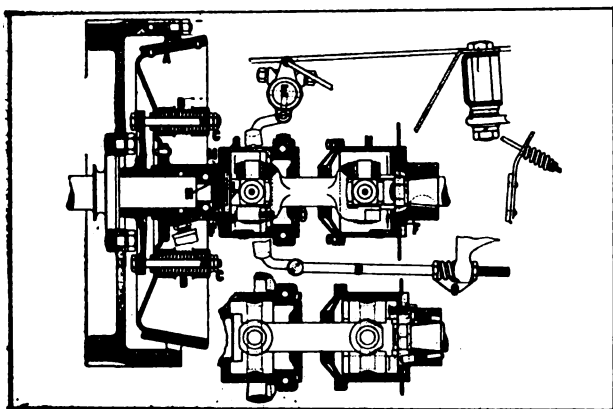


Fig. 2—Sectional View of Cadillac Clutch with Components Lettered to Aid in Its Dismantling and Re-assembly.

necessary to lengthen this member, which is accomplished by means of the nut O. However, if the stay rod is so adjusted that it will permit the clutch to seat firmly, but the latter does not do so on account of insufficient spring tension, the tension should be increased by turning the nuts C on the six springs B B. A little study of the drawing at Fig. 2 should enable one to dismantle and reassemble the clutch components.

Magneto Trouble—H. K. C., Camden, N. J.

Referring to No. 1680 in the Dec. 25 issue, in which "Information" states that in moving his switch lever from the magneto side to "off", the motor sometimes continues to run, could not the trouble be carbon in the cylinders or a hot engine? I have a single-cylinder car and frequently after throwing off the switch the motor will continue to run until I shut off the fuel. The ignition is battery only.

The presence of carbon in sufficient quantities may cause ignition of the mixture, but generally it is preignition of the charge as particles of

points of the carbon become incandescent. An overheated motor will require the shutting off of the supply of fuel to bring it to a stop as above stated.

The trouble referred to by "Information" was evidently caused by the switch not closing properly, as it was stated to occur when operating on the magneto. It should be remembered that with magneto ignition the primary current is short circuited or diverted from the secondary winding by closing the circuit. This is also termed grounding.

Cylinder Scored—E. F. C., Milwaukee, Wis.

In accordance with instructions given me I looked over the timing of the valves of my motor. I also set the timer so that when the spark lever is fully retarded the engine cannot back fire. Is this correct? As I did not locate my trouble I decided to dismantle the motor and found that the wristpin of one cylinder had worked loose and had worn a groove in the cylinder. The groove is too deep to permit of reboring as the cylinder has been rebored. Is there any remedy for filling in the groove that you could suggest? The motor, as near as I can make out, is an air-cooled Corbin. It has T head (?) cylinders with the inlet over the outlet valves. Any information you can supply will be appreciated.

The timer should be set with the piston of the cylinder just about to begin the firing stroke when contact is made between the roller of the commutator and its block, and with the spark lever fully retarded. If the engine idles and operates properly with the setting stated, and without back firing, it is presumably correct.

As far as the writer knows there is no satisfactory method of repairing a scored cylinder other than grinding or reboring. The only remedy would be to fit a new cylinder. If this is done, care should be taken to fit a piston, as it is very probable that the old one would not be of proper dimensions.

As the model of car is not given the timing cannot be given, but it is possible that the flywheel may be marked with the opening and closing points of the valves. If the number of the motor or model can be ascertained, the American Hardware Company, New Britain, Conn., may be able to supply information, as the Corbin Motor Vehicle Corporation was a subsidiary of the concern. The Corbin car has not been manufactured for some time.

Marking Flywheel—A. H. K., Providence, R. I.

I have a second hand car, the four-cylinder motor of which has a plain flywheel; that is, the opening and closing points of the valves are not marked. How should I proceed to mark the rim of the wheel? I know the valve timing.

The first step is to obtain the dead centres, upper and lower. This may be done by the piston, but if the motor be an old one and the timing gears worn, the method will not be as accu-

rate as utilizing the crank throws. The latter should be vertical, and by placing the piston of the No. 1 cylinder (that nearest the radiator) at the top dead centre or the completion of the intake stroke, the upper dead centre point is located. Allowance should be made, however, for lost motion in the gears or bearings as above referred to.

Having located the top or upper dead centre it should be marked, and the flywheel given a half-turn to determine the lower or bottom dead centre. This should be carefully checked before marking the flywheel.

Having marked the centres, the flywheel is laid off. In the factory the events are first laid out at the proper angular distance on a circle equal in diameter to the flywheel of the motor, and the distances from the centre markings

goes past the upper dead centre, and that the piston has begun its downward movement or intake stroke. The intake valve closes 26 degrees after bottom dead centre and the piston has started upward on the compression stroke. The exhaust valve begins to open 46 degrees before lower dead centre or before the firing stroke is completed. It remains open during and until the upper dead centre mark is passed by five degrees.

The diagram shows the points to be marked on the flywheel, and if the strokes are taken into consideration and the fact that two complete revolutions of the crankshaft, equalling 720 degrees, are necessary to obtain a power impulse for each cylinder, the work of timing will be simplified. The opening points referred to mean when the valve begins to lift. It is very probable that the valve tappet mechanism will have

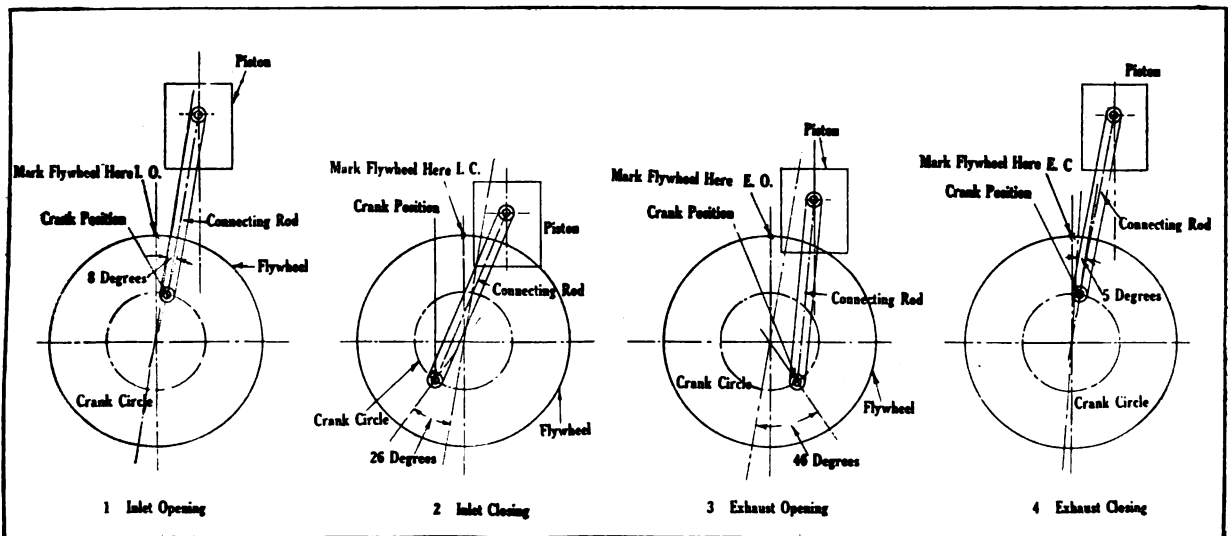


Fig. 3—Illustrating Valve Timing Diagram for Marking Opening and Closing Points on Periphery of Flywheel.

measured linearly on the perimeter of the circle are then determined. These linear distances are utilized in the actual laying off of the flywheel, a steel tape scale generally being employed in the work.

Degrees or inches may be used in laying off the flywheel. Given the diameter of the flywheel it is a simple matter to learn its circumference. The diagram at Fig. 3 shows the method of marking the flywheel. In this instance the timing is as follows: Intake valve opens eight degrees after top dead centre and closes 26 degrees after lower dead centre. The exhaust valve opens 46 degrees before lower dead centre and closes five degrees after top dead centre.

The four strokes and approximate positions of the pistons are shown in the diagram, and it will be seen that the flywheel is turned eight de-

grees past the upper dead centre, and that the piston has begun its downward movement or intake stroke. The intake valve closes 26 degrees after bottom dead centre and the piston has started upward on the compression stroke. The exhaust valve begins to open 46 degrees before lower dead centre or before the firing stroke is completed. It remains open during and until the upper dead centre mark is passed by five degrees.

GERBER BECOMES PRESIDENT.

Factory of Abbott Motor Company Also Being Enlarged for Increased Output.

At the recent annual meeting of the Abbott Motor Company, Detroit, maker of the Abbott-Detroit car, the control of which was purchased last November by E. F. Gerber of Pittsburg, Penn., Mr. Gerber was elected president. The other officers are: Vice president, M. J. Hammer; secretary and treasurer, Francis B. Fick. The factory is being enlarged in order to take care of the increased output planned.

REEVES REPLACES MILES AS MANAGER.

ALFRED REEVES, vice president and general manager of Hartford Suspension Company, Jersey City, N. J., has disposed of his hold-



Samuel A. Miles, Retiring General Manager, National Automobile Chamber of Commerce.

ings in that concern, to become general manager of the National Automobile Chamber of Commerce, succeeding Samuel A. Miles, who has held the position from the very inception of the automobile industry. It is understood, however, that the latter has not been entirely eliminated by the change, but will continue to exercise a

wide influence in the management of the New York and Chicago shows, now held under the auspices of this association.

Alfred Reeves was born in Brooklyn, N. Y., Sept. 16, 1875, and became identified with the automobile industry in 1899. He was one of the early members of the New York Motor Club, and for a number of years was a writer on automobile topics for the Evening Mail, American and Globe in New York City. He helped organize the American Motor Car Manufacturers' Association in February, 1905, and was made general manager during the days when the members of that organization were resisting the so-called Selden patent litigation. When that action was finally decided and the association passed out of existence, he became general manager of the Association of Licensed Automobile Manufacturers, the rival organization, which very soon became the Automobile Board of Trade.

Some time previous to the amalgamation of the last named body with the National Association of Automobile Manufacturers, under the name of the Automobile Chamber of Commerce, Mr. Reeves resigned and identified himself with the Hartford Suspension Company.

Samuel A. Miles was born in Bristol, England, May 10, 1862. He acquired his first car in 1900, and about the same time became actively interested in the Chicago Automobile Club. Shortly after the first show was held in New York City he became convinced that something of this nature would appeal to the residents of the Middle West, and enlisted the co-operation of the Chicago Automobile Club in holding the first Chicago show. When the National Association of Automobile Manufacturers was first formed in that year, he was selected as general manager. That association was reorganized and incorporated in 1904, and Mr. Miles continued as its general manager, until its amalgamation with the Automobile Board of Trade, and has held the same position with the Automobile Chamber of Commerce, now the National Automobile Chamber of Commerce, ever since. It is stated that he retires at this time to devote his entire time to the management of the two shows above mentioned and to certain private interests.

The chamber has adopted a definite policy with respect to legislation, directing its officials to discourage by all proper means the enactment of any legislation which falls within the following classes:

Bills which impose local license or registration fees or local regulations upon automobiles or their owners, or which give authority to minor jurisdictions to regulate the operation of automobiles; such license or registration fees and regulations being in addition to those imposed or fixed by state laws.

Discriminatory bills which impose burdens upon automobiles not borne correspondingly by horse drawn vehicles.

Bills the effect of which is to impose double taxation on automobiles through the imposition of a personal property tax in addition to the exaction of registration and license fees, or otherwise.

All acts imposing an occupation tax on either agents or manufacturers of automobiles, or restricting or regulating the industry or the trade by special legislation.

All legislation requiring the use of specific or proprietary devices or attachments on automobiles in addition to manufacturers' standard equipment.



Alfred Reeves, General Manager, National Automobile Chamber of Commerce.

INAUGURATE "SAFETY FIRST" CAMPAIGN.

Important Movement Headed by Organized Motorists in Effort to Reduce the Number of Automobile Accidents---Practical Attempt to Eliminate Reckless Driving.

ORGANIZED motorists in practically every section of the country have adopted a new slogan: "Safety First". The movement is timely

1. Keep on the sidewalk.
2. Cross the street on the crosswalk.
3. Look up and down the street before you cross.
4. Don't play in the street.
5. Don't "catch on" teams or wagons or cars, or run in the street behind them.
6. Don't jump out into the street from behind teams or automobiles.
7. Before stepping off any street conveyance, look up and down the street.
8. Remember that the street is a place of danger; the sidewalk is the place for children "on foot."

Copy of "Safety First" Card Distributed Among School Children in New Haven, Conn.

and of great importance. The small proportion of reckless drivers is endangering the lives of thousands of people daily and is harmful to the whole industry—and the great majority of law abiding motorists has been seeking for some method of effectually curing this small minority. "Safety First" cannot be expected to overcome all difficulties, but it will help materially.

Statistics oftentimes can be utilized in such manner as to prove almost any desired point. It has been very difficult to secure reliable statistics respecting highway accidents, but such figures as are obtainable have been published by those interested in an effort to demonstrate that automobile accidents are increasing rapidly.

Classification of Accidents.

The National Highways Protective Society has for several years kept a record of traffic accidents of all sorts in the states of New York and New Jersey. According to this society, these are classified as automobile, trolley and wagon, and include only pedestrians knocked down or run over, and occupants of vehicles who received their injury through the fault of some other person. Accidents due to failure of equipment of the vehicle, or to faulty condition of the highway, have not been included, the intention being to note only those accidents for which the driver of some vehicle can reasonably be held to blame.

Under the automobile accidents, as classified by this

society, are included those due to motor vehicles of all descriptions not running upon rails, and all collisions of motor vehicles with all vehicles, except in a few specific cases where the other vehicle was manifestly to blame. Under trolleys are included all electric railways, street and interurban, and all collisions of trolleys and wagons. Wagons include all animal drawn vehicles. The only trolley accidents counted are those to pedestrians, or as the result of collisions. Other injuries to passengers or employees are omitted. Children include all persons under 17 years of age.

The statement of the society further sets forth that the figures are derived from the coroner's reports every month, and that the totals are all somewhat below those of the coroners, due to the difference in classification and to the fact that the definite report of the cause of an injury often does not come to the coroner's office until after the end of the month. It is added that the only large discrepancy is in the figures for wagon fatalities, where it is held probable that the correct figures are much larger than those given in the specific instances cited, in which it is stated that the total number of persons killed in New York City during 1913 by automobiles was 302, by trolleys 108 and by wagons 132. The society feels that the correct figure for wagons should be at least 170. The records of the society show:

Fatalities in New York City.

	1910	1911	1912	1913
Automobile	112	142	221	302
Trolley	148	109	134	108
Wagon	211	172	177	170

Remainder of the State of New York.

	1911	1912	1913
Automobile	132	127	149
Trolley	67	79	79
Wagon	31	28	32

1. Safety should ever be your first consideration.
2. Remember that the other fellow may do the very thing that you do not expect him to do.
3. Every cross street and every highway intersection is a danger spot.
4. Every trolley car or other highway conveyance that is stopped, coming to a stop, or just starting, is a source of danger.
5. Slow down and stop when in doubt.
6. See to it that your brakes are always in good working order.
7. Be cautious about forcing your way through a crowd.
8. Your horn is a danger signal and its unnecessary use is unlawful.
9. Be particularly watchful of children, especially near schools.
10. Consider the feelings and bear in mind the rights of others; favorable public opinion is desirable to you as a driver.
11. Life and limb are precious. Be keen to protect both from harm.
12. Speed is unnecessary, safety is imperative.

"Safety First" Rules Prepared for Consideration by Connecticut Motorists.

State of New Jersey.

	1912	1913
Automobile	91	124
Trolley	41	28
Wagon	16	26

The following table, prepared by this society, gives the number of accidents due to specific classes of vehicles or to particular circumstances of interest:

	New York City	New State	New Jersey
Motorcycles	67	190	96
No light on wagon	10	10	3
No light on automobile	18	18	1
U. S. mail	23	3	1
Taxicab	49	14	•
Fire department	26	5	4
Ambulance	24	2	2
Police and other officials	5	2	2
Children playing in street, etc.	46	12	18
Woman driving automobile	10	14	13

*A few, but not counted.

Basing fatality rates on 1,000,000 of population for various American and foreign cities, this society gives the following figures for the year 1912:

American Cities.

	Automobile	Trolleys	Wagons
New York	47	28	38
Buffalo	49	51	10
Chicago	48	89	52
Pittsburg	52	48	43
Providence	48	35	12
St. Louis	30	64	45
San Francisco	52	61	20
Baltimore	14	35	13
Washington	71	56	20

Foreign Cities.

	Automobile	Trolleys	Wagons
London	46	5	24
Berlin	23	11	31
Paris	47	25	16
Vienna	13	2	15
Glasgow	12	15	19
Liverpool	17	4	16
Edinburgh	15	5	16
Dublin	10	10	22
Belfast	17	4	12
Leeds	19	3	11

Statement of Chicago Coroner.

In this connection, it is of interest to consider an authoritative statement by Peter M. Hoffman, coroner for Cook county, Illinois, which embraces the City of Chicago. He says:

It is clear that comparisons made as to the danger between horse vehicles and power vehicles must be estimated on efficiency, as the number of miles travelled is the only rational basis on which to figure. Accurate figures compiled from the records of Chicago and Cook county show that 1912 was the first year in which the number of automobile accidents ever surpassed horse vehicle accidents, and the mileage percentage of power vehicles as compared with horse vehicles shows that automobiles now average two-to-one safer per mileage than horse drawn vehicles.

Tables accompanying Coroner Hoffman's statement show the number of passenger and freight vehicles of all classes, licensed and unlicensed, on the streets of Chicago, Feb. 10, 1914;

their average daily mileage, and their total daily mileage, accidents and fatalities for the last four years, and the average number of accidents a day for each 5,000,000 miles travelled is as follows:

Number and Daily Mileage.

	No.	Average Mileage	Total Mileage
Horse vehicles	65,118	12	781,416
Power vehicles	37,406	42	1,571,052

Accidents in Four Years.

	Total	Daily Average	Average for 5,000,000 Miles
Horse vehicles	6,047	4.15	26.55
Power vehicles	5,784	3.96	12.60

Mr. Hoffman's record of coroner's cases or fatalities for the four years show the following:

	Street Railway	Horse Vehicle	Power Vehicle
1910	175	67	52
1911	161	75	75
1912	209	49	96
1913	165	44	136

Automobiles Less Dangerous Than Wagons.

A careful analysis of these figures will demonstrate that automobiles are by no means so dangerous as they are made to appear, but there is sufficient reason for making every effort to reduce the number of fatalities. Referring once more to the figures of the National Highways Protective Society, it is stated that the percentage of children (under 17 years of age) killed during the years of 1910, 1911, 1912 and 1913 in New York City was as follows: By automobile, 45; by trolleys, 31; by wagons, 52. In the remainder of the State of New York the percentages for 1911, 1912 and 1913 were: By automobile, 26; by trolley, 25; by wagon, 42. In New Jersey, the percentages for 1912 and 1913 were: By automobile, 36; by trolleys, 36; by wagons, 50. Obviously, these percentages are based on the total number of fatalities resulting from the respective causes, and it would seem that, contrary to the general belief, accidents to children due to automobiles were much less frequent than those due to wagons.

Perhaps, because it is realized that the children of today are the men and women of tomorrow, the "Safety First" campaign now being inaugurated is finding its greatest activity, just at present, in educating the children to the necessity for the greatest amount of caution. It is unnecessary to cite more than a few cases to illustrate this phase of the subject.

Co-Operation with Public Schools.

The New Haven Automobile Club, New Haven, Conn., has distributed more than 50,000 small cards, through the co-operation of Mr. Blood, superintendent of schools, to the school

children of that city, and has posted in a conspicuous place in each schoolroom placards bearing the same rules. The Albany Automobile Club, Albany, N. Y., has adopted a simple catechism, which is virtually being made a part of the regular course of instruction in the schools of the city, with the approval of the department of education. Similar catechisms have been prepared by other clubs throughout the country and are used in practically the same manner. Examples of these are shown herewith.

The New Haven Automobile Club, and many of the others, is not content to leave the matter with issuing cards to school children, but has prepared similar cards for distribution to every member of the club and to all motorists in the city. In addition, large placards have been posted in conspicuous places, bearing the same wording.

New methods of calling attention to the slogan, "Safety First", are being devised every day. Trolley companies are volunteering to post the rules in their cars. Moving picture houses are throwing them upon the screens. Placards are being posted in large factories. Very soon everybody will be impressed with the necessity for caution, and, perhaps, it is not too much to expect that those who have been guilty of reckless driving may become imbued with the same spirit.

However, this is but the beginning. There is something bigger and deeper behind all this agitation for "Safety First". Reckless driving endangers all users of the highways—the motorist, as well as the pedestrian and the occupant of the horse drawn vehicle. The movement is one of self-preservation, of co-operation, of general humanitarianism.

PLANS FOR SUMMER MEETING.

Society of Automobile Engineers Will Assemble at Cape May, N. J., in June.

The council of the Society of Automobile Engineers has decided upon Cape May, N. J., as the

place in which the summer meeting of the organization will be held, June 23-26. The convention headquarters will be in the new Cape May hotel, where the various sessions will be held as follows:

Tuesday, June 23, meeting of the standards committee at 2 in the afternoon. Wednesday, June 24, business and professional session at 2 in the afternoon; entertainment by sections of the society at 8 in the evening. Thursday, June 25, professional sessions at 9:30 in the morning and

1. What Should You Do Before Crossing a Street?

I should stop and look both ways, first to the left (as danger will likely be nearer from that side) and then to the right. If the street is clear for at least half a block, then I can go ahead and cross the street quickly.

2. Where Is the Proper Place for You or Any One to Cross the Street?

At a crossing, and I should never cross a street at any other point, for the reason that there is less danger at crossings than at any other point.

3. When You Are Playing in the Street, What Should You Always Keep in Mind?

That I have chosen the most dangerous place possible in which to play and that automobiles and other vehicles approach swiftly and silently and are liable to kill me if they strike me.

4. Why Should You Not Play in a Street Frequently Used by Automobiles or Other Vehicles?

Because I am apt to bewilder the drivers, thus making them lose control of their vehicles, which would be dangerous not only to me but also to others.

5. What Would You Do if You Were Standing in the Middle of the Street and Should See Automobiles or Other Vehicles Coming Both Ways?

If I am caught in the middle of the street with vehicles approaching from both directions I should stand perfectly still and let the vehicles pass around me, because they are not likely to run over me if I do not move.

6. What Danger Is There in Stealing a Ride on an Automobile or Other Vehicle?

I am in danger of falling off and being injured, or I may be run over by another vehicle when I jump off. This is a very dangerous practise and I should avoid it.

7. In Case a Child or Any One Is Injured by an Automobile, What Is the First Thing to Do?

I should secure assistance and get the injured one to the nearest hospital as quickly as possible.

8. Should You Ever Throw a Stone at an Automobile or Other Vehicle and Why?

I should never throw a stone or other missile at any vehicle because I might hurt some one or damage the vehicle, or cause the driver to lose control, which might result in an accident and for the reason that it is against the law.

9. Should You Look After Younger Children in Crossing Streets, and Why?

I should assist younger children in crossing the street because they cannot think as quickly as I can and may not realize the danger which threatens them.

10. What Should You Do if You See an Automobile or Other Vehicle Unattended Standing on the Street?

I should not go near it.

11. Should You Ever Use Roller Skates, Coasters or Other Similar Contrivances on the Streets?

Never, because they are always dangerous, particularly on the streets frequented by automobiles and other vehicles, for the reason that I cannot perfectly control my movement and, therefore, am continually liable to be severely injured or killed.

Example of Catechism Now Being Taught in Public Schools of Many Cities—This One Was Prepared in Co-Operation with the Board of Education in Albany, N. Y.

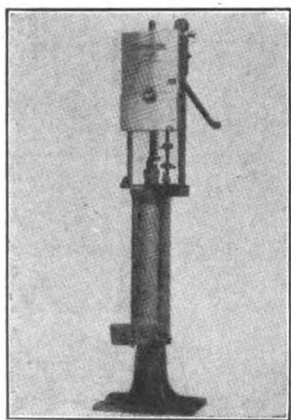
2 in the afternoon; dinner and European trip lecture at 8 in the evening. Friday, June 26, professional session at 9:30 in the morning, with final adjournment about 1 in the afternoon.

It is expected that some 600 members and guests will be in attendance.

Truffault-Hartford shock absorbers were fitted to Edward Pullen's Mercer, with which he won Grand Prize, Santa Monica, Cal., Feb. 28.

MACHINERY, TOOLS, EQUIPMENT AND SUPPLIES.

MANY proprietors of garages complain that it is impossible to prevent a shrinkage in handling gasoline, as more or less of the fuel is used in the repair shop, etc., and it is difficult to check up the amount utilized. The Charles H. Simerson Company, 4135 Hudson boulevard, West Hoboken, N. J., has been organized to manufacture the Pumplok, which is held to solve the waste problem and to possess other practical features.



Simerson Pumplok.

One of the qualities of the device is that it is stated it may be attached to a standard pump in 10 minutes by engaging the main shaft by means of a slotted shaft, the construction being retained in place by an adjustable clamp that is locked and sealed, as shown in an accompanying illustration. It not only prevents unauthorized drawing of gasoline, but checks the amount drawn by each person having access to the pump.

The drawing of fuel is made possible by the use of key checks, each person being supplied with a given number bearing his number or individual design. Consequently, each must account for as much gasoline as represented by the checks found in the Pumplok's receptacle. A simple tally sheet is utilized and the operator sets down the quantity drawn, and the price for cash or charge sales.

A separate counter is incorporated, showing tenths of a gallon, which may be adapted to single or double acting pumps and to indicate the actual amount of gasoline drawn, whether in even gallons or fractions. A separate key check is required for each gallon or fraction thereof, and the pump is locked at the completion of each drawing, so that the next operator cannot take advantage of the fact that only a fractional quantity was drawn by the previous workman. The amount drawn is set down on the tally sheet as shown by the counter.

If any extra checks appear the attendant whose number they bear can be called to account. This prevents charge sales or even cash sales from being forgotten. It is stated by the inventor that it is impossible to remove the pump

gear housing with its gears, and draw fuel by actuating the rack in other than the usual manner.

AUTO-FLEX TUBING.

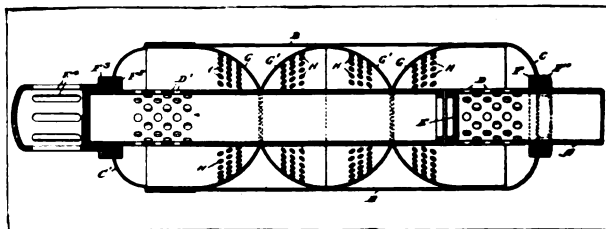
The National Metal Molding Company, Pittsburg, Penn., is manufacturing a new flexible tubing termed Auto-Flex. It is designed especially for enclosing wires utilized in electric lighting on motor cars, and fittings are also supplied. It is made in two forms, type A being made up of selected rigid fibre cord coiled upon itself in the form of a helix and tightly interwoven with very tough thread to form a tube, which is treated with a moisture proof compound. A covering of yarn is woven over the tube.

Type B is constructed in a similar manner, with the exception that the outer covering is braided and the mica finish is not used. It is utilized for wiring to the headlights or to any other point where the tube is exposed, and its surface is smooth for painting. Type A is employed for concealed work, such as under the hood or upon the chassis.

The fittings have been standardized, and particular attention has been paid to centralizing control and the distribution of the lighting circuits in one box and to the separation and arrangement of contact strips, so that connecting and testing is simplified.

STEINMETZ MUFFLER.

Joseph A. Steinmetz of the Janney, Steinmetz Company, Philadelphia, has been granted a patent for a muffler for internal combustion engines which is held to be very efficient in reducing noise and back pressure. The design, which is shown in section in an accompanying illustration, includes the usual outer casing, which is

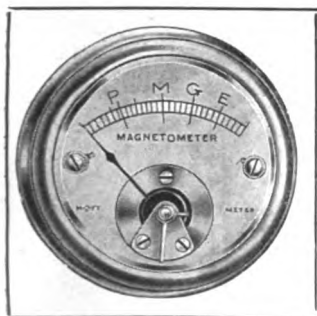


Steinmetz Muffler, a Light Weight, Compact Design.

constructed of very light thin metal.

A small concentric tube passes axially through the larger member, and is provided with

perforations, and partitions are included as indicated. Loosely mounted on the inner and fitting the outer tube, are oppositely turned perforated resilient rounded cups. These cups



Hoyt Ford Magnetometer.

are so arranged that one receives the gases from the perforations and the other discharges. The passage of the gases is easily traced and it will be noted that they pass out into the open air through slots.

Features of muffler emphasized are: Light weight, easily disassembled and assembled for cleaning, etc.; efficient radiation of heat and the elimination of back pressure.

K & B ADJUSTABLE WRENCH.

The Kilborn & Bishop Company, New Haven, Conn., is manufacturing the K & B adjustable wrench, which opens on an angle of 22.5 degrees with the handle, permitting of its use in places difficult of access with ordinary tools. All parts are interchangeable and carefully fitted. The movable jaw and handle are each a solid piece steel drop forging. The shape of the handle is such that the hand readily becomes conformed to it.

HOYT FORD MAGNETOMETER.

The Hoyt Electrical Instrument Works, Penacook, N. H., maker of fine electrical indicating devices, has brought out a new magnetometer for the model T Ford which presents many practical features and is moderately priced. The Hoyt differs from other instruments utilized to ascertain the condition of the Ford flywheel magneto in that it is connected permanently in the circuit, being mounted on the dash. It is a sturdy little instrument, and is but two inches in diameter.

As will be noted by the accompanying illustration, the dial is calibrated, the letters indicating Poor, Medium, Good and Excellent. With the magneto operating, the indicating hand moves over the dial, indicating the condition of the generator at various speeds. The efficiency of the magneto is determined easily. After installing the magnetometer, readings at various speeds are taken, and by comparing these with those taken later, it is a simple matter to learn if

the efficiency of magneto is not up to standard.

The Hoyt instrument is easily attached by drilling two .1875-inch holes in the dash and securing the studs by lock washers and nuts. The wiring is simple and the entire construction can be installed in a few minutes. The Hoyt is constructed with the same care and high grade material for which the product of this concern is noted. Each instrument is carefully tested.

NEW BATTERY CATALOGUE.

The Electric Storage Battery Company, Philadelphia, is issuing a new catalogue, SL, describing the Exide battery utilized with automobile lighting and starting systems. It contains very complete information and data on the subject of batteries and will be forwarded on request.

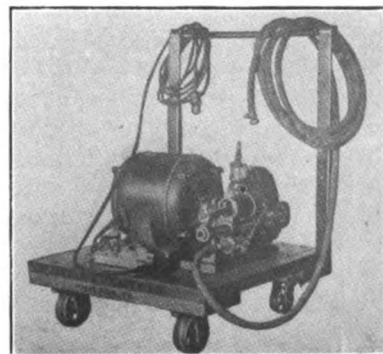
NEW SIZES IN DAYTON TIRES.

The Dayton Rubber Manufacturing Company, Dayton, O., maker of the Dayton airless tire, announces that it is ready to supply its product in 28 by three and 30 by three-inch sizes for cyclecar service.

BASTIAN GARAGE OUTFIT.

The General Utility Company, 1326 Ogden street, Philadelphia, is marketing a line of air compressors for garages and service stations. These include belt and gear driven pumps and equipments with and without tanks. That shown in an accompanying illustration is the model E, an electrically operated outfit, which is without a tank and is held to be very efficient and economical of current.

The outfit, which includes pump, electric motor, gauge, safety valve, 20 feet of hose, indicating starting switch, 20 feet of cable and plug, is mounted on an oak platform 22 by 24 inches. The equipment is moved easily about the garage, as it is mounted on rollers, suitable handles being provided. The General Utility Company will forward catalogue giving details and trade prices on request.



Bastian Model E Garage Outfit.

IMPROVED ROADS AND MOTORING LAWS.

California Supreme Court Decides New Law Is Constitutional---Committee Named to Watch Legislation in Bay State---New York Seeks to Increase Registration Fees.

THE supreme court of California has decided that the law enacted by the legislature of 1913 is constitutional. Several points were raised by organized motorists, although the principal objection was to the registration fee based on the horsepower rating, ranging from \$5 to \$30. In the opinion, which was written by Judge Henry Melvin, the court says:

Repair of the public highways is not a police measure, yet it is evident that the bill was passed for the principal purpose of raising revenue for use in the upkeep of such highways. The court is not concerned with what use is to be made by the state with the revenue derived by the tax, and the rest of the act would be valid, even if that clause relating to the distribution of the funds were void.

The act is not local or special in its nature because a greater portion of the funds is to be expended outside the cities. The state is charging for the privilege of using the roads for these highly destructive vehicles at a rate of speed not attainable by those propelled by animal power. The privilege is open alike to the rural and urban owner of a motor car.

In the statute we are endeavoring to construe there is an attempt to apportion the charge with some reference to the destruction or wearing power of each motor vehicle. While we cannot say that the relative horsepower of vehicles is the most scientific basis of measuring their potency of injury to the roads, we cannot say that it is not without justification.

MANY MASSACHUSETTS BILLS.

Motoring Organizations Appoint Committee to Have Charge of Legislative Matters.

A committee representing the Bay State Automobile Association, Electric Motor Car Club, Massachusetts State Automobile Association, Massachusetts Automobile Operators' Association, New England Section of the Electric Vehicle Association of America, Boston Automobile Dealers' Association and the Boston Commercial Motor Vehicle Association, has been appointed in Boston to consider bills pending before the present session of the legislature. It would appear, from the list of such bills made public, that this committee would be exceedingly busy.

The provisions of these include the following: Increasing the registration fees on trucks to \$5 a ton; raising the renewal fee for operators from 50 cents to \$1; fixing a maximum speed limit of 25 miles an hour; compelling horse drawn vehicles to carry lights in all sections of the state; eliminating the provision in the present law admitting non-residents for a period of 10 days only in any calendar year; increasing the penalties for

reckless driving; providing a maximum sentence of five years for taking cars without permission; fitting mudguards to prevent splashing behind or sideways more than two feet; displaying two side lights, one of deep green color on the right and one of deep red color on the left, the glass to be of magnifying power, not ordinary common glass, etc.

NEW LAW IS PASSED.

Understood That Ohio Motorists Will Not Object to Registration Fees.

The business for which the special session of the Ohio legislature was called having been completed by the passage of a new motoring law, to take the place of the so-called Warnes law, held by the courts to be unconstitutional, that body has adjourned sine die. The new measure provides for registering all motor vehicles on a flat rate basis—electrics at \$3, gasoline and steam machines at \$5, and cars with manufacturers and dealers, \$2 each.

The sections of the Warnes bill, providing for the examination and registration of chauffeurs, were re-enacted. By a two-thirds vote the law was made effective immediately, instead of waiting 90 days as usual. It is understood that the motoring organizations will file no objections to the flat rate fees, which are practically the same as those in force under the old law.

UTAH AIDS COLORADO.

Pikes Peak Ocean-to-Ocean Highway Will Be Continued Through Former State.

As a result of a conference between officials of the Salt Lake City Commercial Club and the Pikes Peak Ocean-to-Ocean Highway Association, the latter being composed of people representing several counties in Colorado, Feb. 24, it was formally decided to adopt measures looking toward an extension of the highway, now under process of construction across Colorado, to Salt Lake City, by way of Jensen, Vernal, Roosevelt, Colton and Provo. The meeting was held in Provo, and was attended by county commissioners and representatives from various Utah coun-

ties interested. In consideration of this promised co-operation the Colorado committee pledged that the work necessary between Meeker and the Utah line would be completed by July 1.

By this action it is definitely decided that the Pikes Peak Ocean-to-Ocean highway will meet the Lincoln highway at Salt Lake City. The Utah people have pledged that they will take up the work with county officials in Nevada and California and bring about the early organization of units in those states. The Colorado committee will now turn its attention toward the extension of the route eastward through Kansas, Missouri, Illinois, Indiana and Ohio.

It is not the purpose of the Colorado organization to detract in any way from the importance of the Lincoln highway movement, but rather to afford an alternate transcontinental route over what has been known as the Midland trail. The work in Colorado has been under way for some few years and much of the highway across that state has been placed in first class condition. Already some \$200,000 has been expended, and work contemplating the expenditure of between \$100,000 and \$200,000 is planned for 1914.

INCREASES REGISTRATION FEES.

New York Legislature to Consider National Highways Protective Society's Bill.

A bill prepared by a committee representing the National Highways Protective Society, New York City, headed by President Frederic R. Coudert, has been introduced in the New York legislature by Senator Walter R. Herrick. In effect, it would amend the so-called Callan law by increasing the registration fees for motor vehicles and reducing the driver's license fee from \$5 to \$3. It is expected that the bill will produce at least \$500,000 annually for highways.

Under its terms machines are divided into classes, according to horsepower and weight, with fees ranging from 50 cents to \$1 a horsepower, according to class. Commercial vehicles weighing over two tons are required to pay an additional fee of \$10. Electric machines, except trucks of more than two tons weight, pay a flat rate of \$10 for registration, irrespective of horsepower. The registration fee is to be the only tax on motor vehicles, except in the case of machines in the hands of manufacturers and dealers, and those that may be used for "hacking" purposes.

Local ordinances regulating automobile traffic as differing from other traffic are prohibited,

except in cities of the first class. Speed limits are set for other cities, towns and villages. Drivers must not approach within eight feet of a street car which has stopped, and must bring their machines to a dead stop upon signal from any person driving a horse. Motorcycles are required to carry number plates.

THE LINCOLN HIGHWAY.

City Officials Take Action Renaming Sections Traversing Their Municipalities.

The hearty co-operation of city officials along the route of the Lincoln highway, from New York to San Francisco, is being demonstrated in a practical manner by the recent action of several city councils, in changing the names of streets traversed by this thoroughfare. As is more or less well known, the Lincoln Highway Association, with headquarters in Detroit, is behind a movement to construct a concrete roadway across the continent, and a fund of \$10,000,000 is now being raised for this purpose. The route has been selected, and much of the fund has been subscribed.

Following the example set by other cities, the Automobile Club of Aurora, Ill., has prepared a petition to be presented to the city council, requesting that the name of the street traversed in that city be changed to Lincoln way. In South Bend, Ind., B. C. Walters, Rome C. Stevenson and M. L. Williams have been appointed as a committee to draft an ordinance changing the name of Vistula and Michigan avenues to Lincoln way. In Kearney, Neb., the principal street will be called by this new name, and in many points in Pennsylvania, Indiana, Iowa, Wyoming and other states, the same programme is being carried out.

Among the latest city councils to take such action are those of Lisbon and Nevada, O. In the former city the name of Walnut street has been dropped, and in the latter, North Morrison, Balliet, Main and Center streets have been designated as Lincoln way.

Citizens of Chambersburg, Penn., recently erected an arch at the square in the centre of the city calling the attention of travellers to the fact that it was over this route that Gen. Robert E. Lee marched the Rebel army to Gettysburg. Beneath this arch there now hangs a sign reading: "Now the Lincoln Way". The pillars on either side bear the official marker of the association—a strip of red above and a band of blue below a white background bearing the words "Lincoln Highway" and the letter L.

CYCLECARS REVEALED AT BOSTON SHOW.

Largest Number of Makes Yet Displayed at One Time in America--New England Manufacturers Well Represented in the List--Some Entirely New Models.

EXCEEDING in number of makes those presented at any previous display in this country, the cyclecar section of the Boston automobile show was in many respects one of the most important features of the exhibition. All told, there were 14 different makes of machines, as follows: Bantam, Dudley, Duryea, Economycar, Euclid, Herreshoff, Imp, Laconia, LaVigne, Mercury, Merz, Salvador, Trumbull and Twombly. The Duryea, Herreshoff and Salvador were late in arriving, and it was not until Wednesday that the list was complete. Each maker was represented by at least one model, the Euclid and Mercury by two and the Bantam by a complete car and stripped chassis.

Four of these were seen at New York—Imp, LaVigne, Trumbull and Twombly—while the

land is something of a cyclecar producing centre itself. The Bantam and Salvador are manufactured in Boston; the Trumbull in Bridgeport, Conn.; the Euclid in New Haven (or West Haven), Conn.; the Laconia in Laconia, N. H., and it is stated that the Economycar, while heretofore produced in Indianapolis, is soon to be transferred to Boston.

Strictly speaking, while all the makes shown at Boston are listed as cyclecars, they must be classified, under the definitions of the Cyclecar Manufacturers National Association, as true cyclecars and light cars. The Euclid, LaVigne, Salvador, Trumbull and Twombly come under the latter classification. Most of these machines have been described at some length in these columns, and the details should be somewhat familiar to readers of The Automobile Journal.

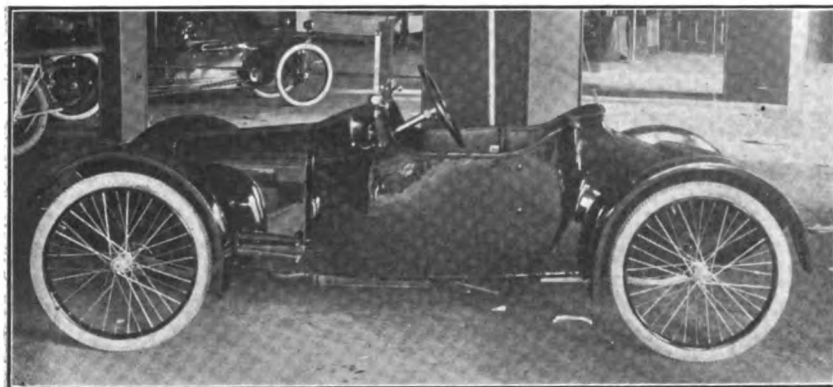
Bantam a True Cyclecar.

The Bantam is entirely new. It is manufactured by the Bantam Motor Company, Boston, and the car and chassis on view were produced in the shops of the Lenox Motor Car Company of that city, although it is stated that that concern has no connection with the maker. The car has wheelbase of 86 inches, tread of 46, and weighs about 700 pounds. The two passengers are seated side by side.

The motor is a two-cylinder, air-cooled V unit, with 3.5-inch bore and 3.75-inch stroke, rated at 9-14 horsepower. Power is transmitted by friction discs and chain to a semi-floating rear axle with differential. The wire wheels carry 28 by three-inch tires. The driver is located at the left, with control levers in the centre, and entrance to the body is by one door at the right. At the rear is a compartment for luggage, which also provides room for a set of dry cells supplying current for electric lights front and rear.

Duryea's Roller Drive.

While it has been known for some that Charles E. Duryea, who produced his first gasoline car in 1891, was working on a cyclecar, the complete details were not made public previous



Where the Laconia Was Displayed at Boston Show—Dudley in Background.

Zip also was exhibited during the closing days of that display. At Chicago this branch of the industry was represented by the Imp, Mercury, Coey Junior, Keller-Kar, Trumbull, LaVigne and Rex. At Detroit, which is reggraded as the centre of the cyclecar, as well as the automobile industry, there were displayed the LaVigne, Rocket, Packet, Mercury, Cricket, Hawk and Detroit.

New England Well Represented.

It will be seen that the Boston show has set an entirely new record in this field, and because of the number of makes on display and the splendid public interest in cyclecars generally, it readily will be appreciated that this was an important feature of the exhibition. Moreover, it was pretty thoroughly demonstrated that New Eng-

to the opening of the Boston show. The Duryea, which is a true cyclecar, is made by the Cresson-Morris Company, Philadelphia, and departs from what might be termed standard practise, in that the motor is located at the rear. The hood at the front, which causes the car to have a conventional appearance, is with a detachable door and provides excellent carrying space for luggage, etc. Two persons are seated side by side. The wheelbase is 100 inches and the tread 44. The weight is about 600 pounds.

The machine was shown equipped with a De Luxe motor, but it is understood that a two-cylinder, four-cycle, air-cooled, opposed engine, rated at 12-15 horsepower, will be employed. Power is transmitted by the Duryea patented roller transmission, which provides three forward speeds and reverse. The shaft carrying these rollers at either end really is an extension of the crankshaft, and it will be understood that the rollers always travel in the same direction. A ring on the inner side of the wheel rim engages with a slot on the roller, three slots providing the three speeds, and when the lowest speed groove is made to contact with a ring midway of the spokes, the reverse is engaged. When the rollers are brought out of contact with both rings, a neutralizing effect is obtained. It thus will be seen that the power plant and transmission are virtually a unit, and the whole of this mechanism is placed almost directly over the rear axle.

The fuel tank is located under the hood at the rear, just behind the seat. The wire wheels are fitted with 28 by 2.75-inch tires in front and 28 by three-inch rear. The equipment includes lamps, horn and tools, and a top and windshield are listed as extras.

Worm Driven Laconia.

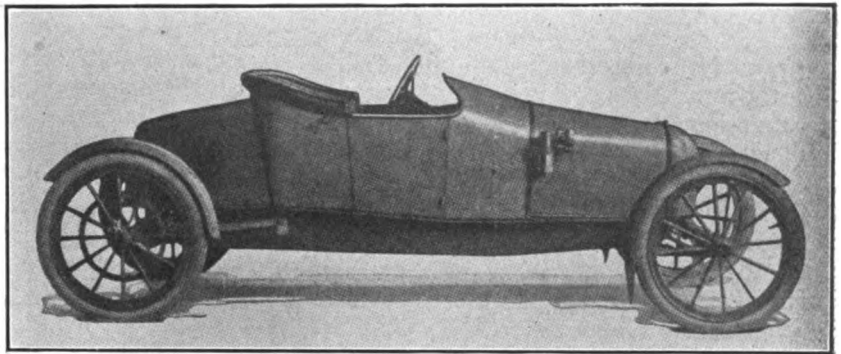
Another entirely new model is the Laconia, made by H. H. Buffum in the shops of the Laconia Car Company, Laconia, N. H., which concern is well known as maker of trolley cars. It is stated that it is the intention of Mr. Buffum to produce only 100 cars the first season. The model shown is said to have been on the road since last June, and to have demonstrated its practicability in every way, but it is not desired to engage in quantity production until such time as the public has had opportunity to test the design and construction in actual service.

The car has wheelbase of 90 inches and tread

of 40. The weight is about 400 pounds. The two passengers are seated, one a trifle behind the other. As shown, the motor is a twin-cylinder, seven horsepower Indian, although it is understood that an engine of original design will be employed later. This drives by shaft to a friction disc, located directly over the rear axle, the friction wheel transmitting energy to a worm assembly. The spring suspension is double cantilever. The driver is located at the left, with central control levers. The equipment will include a top and windshield, etc.

Salvador Light Car.

The Salvador light car is made by the Salvador Motor Company, 126 Massachusetts avenue, Boston, with factory at 28 Scotia street. The designer is G. B. Mansur of Boston, who is said to have been identified with the automobile industry for the past 12 years, with companies in this country and abroad. The car seats two passengers side by side, and has wheelbase of 100



Duryea Model, of Conventional Appearance, but with Motor at the Rear.

inches and tread of 40. The weight is not stated.

The motor is a four-cylinder, water-cooled, L head unit, cast en bloc, with bore of 70 mm and stroke of 100 mm (about 2.75 by 3.9 inches). Lubrication is by constant level splash with pump circulation, and cooling by thermo-syphon. The clutch is a cone, and the transmission affords three forward speeds and reverse. The wheels are of wire and carry 28 by three-inch tires. The driver is located at the left, with central control levers.

Twombly with Poppet Valve Motor.

In the main, the other machines shown have not been changed materially from the designs originally announced, although there has been slight modification of the body lines with a few. The Twombly model is now fitted with a four-cylinder poppet valve motor, this being produced by the Driggs-Seabury Ordnance Corporation, Sharon, Penn. It is announced, however, that the Twombly Car Corporation, New York City,

has not abandoned its intention of using the special Twombly piston valve motor, and that experiments with this product are still under way at the factory of the company in Avondale, N. J.

During the week several rumors of the formation of additional cyclecar companies in Boston and elsewhere in New England were heard, but nothing definite was learned. It is known, however, that several men are interested in the subject, and it is not unlikely that public announcements will be forthcoming within a few weeks or months. There can be little doubt of the fact that the excellent display made by this branch of the industry in connection with the Boston show will have the effect of still further increasing the interest of New England people in cyclecar productions.

CYCLECAR CLUB FORMED.

New England Enthusiasts Organize During the Progress of Boston Show.

One of the interesting events in connection with the annual Boston automobile show was the organization of the Cyclecar Club of New England, which was consummated in the Hotel Oxford, Wednesday evening, March 11. The meeting was called to order by Dr. Charles G. Percival, who has been identified with the sale of the Imp; and among those present were Vice President R. F. Kelsey and Secretary F. E. Spooner of the National Cyclecar Club of America, both of whom spoke respecting the urgent need of an organization of this character in New England.

It is understood that permanent quarters will be located in the Hotel Oxford, and the club starts with a membership of 21, representing those interested in 18 makes of cyclecars. The officers are as follows: President, E. P. Blake; first vice president, H. Ross Maddocks; second vice president, C. J. Fischer; secretary, C. S. Roberts; directors, F. J. Tyler, J. S. Richards, F. S. Corlew, A. C. Gosse and Joseph E. Green.

AND THE PRIDEMORE, ALSO.

Designed by W. A. Pridemore and Sold by F. W. Skinner in Northfield, Minn.

One of the latest cyclecar models is the Pridemore, designed by W. A. Pridemore and produced by the Pridemore Machine Works, Northfield, Minn. F. W. Skinner has charge of the sales end of the business. Three body types are

to be fitted, a tandem two-seater, side-by-side roadster, and delivery wagon. The wheelbase is 100 inches and the tread 40. The chassis weighs about 450 pounds and the completed car about 600.

The motor is a two-cylinder, air-cooled unit, rated by the maker at 12-14 horsepower. Power is transmitted by friction discs and thence by chains to the rear wheels, with a differential incorporated in the jackshaft. The wire wheels carry 28 by 2.5-inch tires.

EXPECTS CAR SHORTAGE.

Krit Dealer Makes Analysis of Situation at Conclusion of Western Trip.

That there is to be a shortage of motor cars of moderate price during the 1914 season is the prediction of F. W. Pilling, western sales manager of the Krit Motor Car Company, Detroit, upon his return to the factory after a five weeks' trip throughout the Middle West. Mr. Pilling finds a strong demand in that section for cars in the \$1000 class, and he attributes this to the general condition of prosperity that prevails in the districts visited by him.

In making his analysis of the situation, he says that dealers are ordering in car load lots, and that his concern is sending double deck shipments every week to such points as Minneapolis, Kansas City, Chicago, St. Joseph, Des Moines and Omaha.

MILLER, SECOND AND THIRD.

This Make of Tires Fitted to Marmon and Alco Machines Finishing at Santa Monica.

As stated in the last issue of The Automobile Journal, Miller tires, made by the Miller Rubber Company, Akron, O., were fitted to the Touraine car, driven by Joermans to fourth place in the Vanderbilt Cup race at Santa Monica, Cal. The same make of tires also was fitted to Ball's Marmon and Taylor's Alco in the Grand Prize. These machines finished in second and third place.

It is of interest, in this connection, to note that Miller tires were used by Teddy Tetzlaff on his Fiat with which he secured a world's road racing record over the same course in 1912. The Miller company asserts that none of these shoes was specially made in any way, and that anyone may select a tire of identically the same material and workmanship as those used in these races, from any Miller dealer.

HINTS FOR NEW CAR OWNERS.

Care and Maintenance of Simms Magnetos—Ford Flywheel Magneto Hints—Adjusting Bearings and Removing Wheels of Premier Rear Axle.

AS SIMMS magnetos are standard equipment on several 1914 models, a knowledge of the operation of their components will be of

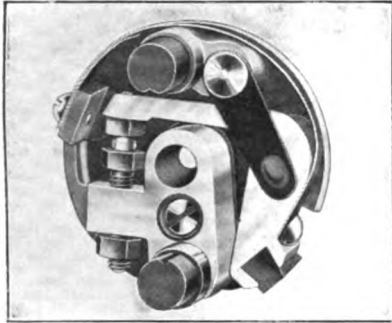


Fig. 1—Circuit Breaker of Simms Dual System.

value in their care and attention. The product of the Simms Magneto Company, East Orange, N. J., comprises two forms, the independent or true high-tension instruments, known

as types SU4, SU6, SUW4 and SUW6, and dual forms listed as types SU4S, SU6S, SUW4S and SUW6S. The last named are exactly the same in general construction as the independent types, with the exception that the contact breaker is equipped with two conductor brushes and a commutator is used in place of the usual dust cover on the breaker box. The figures utilized designate the number of segments employed with each magneto; that is, the 4 represents an instrument adapted for service with a four-cylinder motor and the 6 a six-cylinder.

True High-Tension Types.

The Simms magnetos employ a double wound armature; that is, the primary current generated is induced in a secondary winding in the instrument itself and no coil is utilized to transform the low-tension current.

There is but little for the owner to do other than cleaning, oiling and maintaining the proper gap of the contact points and spark plugs. The circuit breaker mechanism of the dual type instrument is shown at Fig. 1. It is identical with that employed with the independent type, with the exception that the brushes are not used with the latter construction.

Proper Break of Points.

It is important that the gap of the contact points conform to the gauge provided with each magneto, and that that of the spark plugs be 1-50 inch, about the thickness of an ordinary 10-cent piece. The method of adjusting the points is sim-

ple. The armature is rotated by slowly turning the starting crank until the fibre block makes contact with the cam ring at its thickest portion. At this point the contact members should be fully separated. If the gauge slips in easily between the points it shows that the break is too large. By loosening the locking nut on the fixed platinum pointed screw, the latter may be screwed outward or brought closer to the movable point on the interrupter lever. The adjustment should be so made that the gauge will fit snugly. It is important that the lock nut be tightened upon the completion of the work. The steps were illustrated in the Feb. 25 issue of The Automobile Journal. The wiring plan of the independent type is shown at Fig. 3 A. Its simplicity is apparent.

Simms Dual System.

The Simms dual system differs from conventional practise in that the dash switch contains no induction coil or high-tension switch, and has but three low-tension connections to the switch and one to the battery, as will be noted by the plan presented at Fig. 3 B. There are but two contacts in the switch, "On" and "Off", and these are not sliding. One of the qualities of the design emphasized is that any error made in connecting the magneto to the switch will not injure the system, and the battery cannot be exhausted if the switch be left at the "On" position with the motor inoperative.

A vibrating or battery spark is produced through the dual coil, which is of the cartridge type and water proof. Its interior consists of a magnet wound with heavy wire, a condenser and a rapid vibrator. The sec-

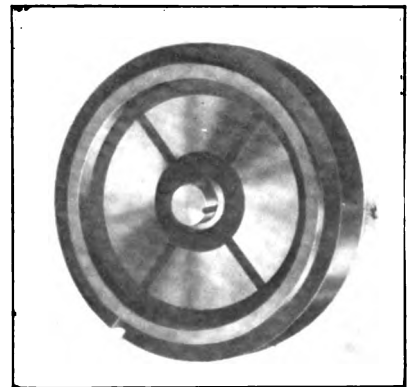


Fig. 2—Commutator of Simms Dual System.

ondary winding of the magneto's armature is utilized to transform the battery current, and when the battery contact but-

ton on the switch is locked in place, and the conductor brushes (Fig. 1) are on the live (short) segments of the commutator shown at Fig. 2, a constant shower of sparks is delivered to the cylinder on compression.

Function of Commutator.

The commutator referred to consists of a disc of heat resisting, insulated material, into which are molded four bronze segments with the four-cylinder unit and six with the six-cylinder magneto. Two of these segments are connected with the outside terminals of the commutator, the others serving simply as a path for the contact breaker brushes. The commutator replaces the usual end cover; is held in place by a flat spring, and is retained in its proper position by a substantial pin projecting from the timing lever, which engages a corresponding keyway or slot in the commutator. The last named is displaced by pushing the flat spring to one side.

the lower or + terminal on the commutator, and that the other lead from the battery runs to the switch. The ground is from the switch. The remaining leads from the switch are connected to the commutator as indicated.

The Simms Magneto Company recommends the use of a drop or two of 3-in-1 lubricant every 1000 miles of service. The two oiling holes are marked.

Before condemning the action of the magneto it is important that all wiring and connections be examined. With the independent type it is necessary that the wire leading from the breaker box cover be not grounded except when the switch is moved to the "Off" position. If the lead be suspected of fault, it may be tested by removing it from the cover and noting the operation of the instrument. If the spark jumps the safety spark gap it is probably due to a loose connection, broken cable, dirt on the conductor or brass bar

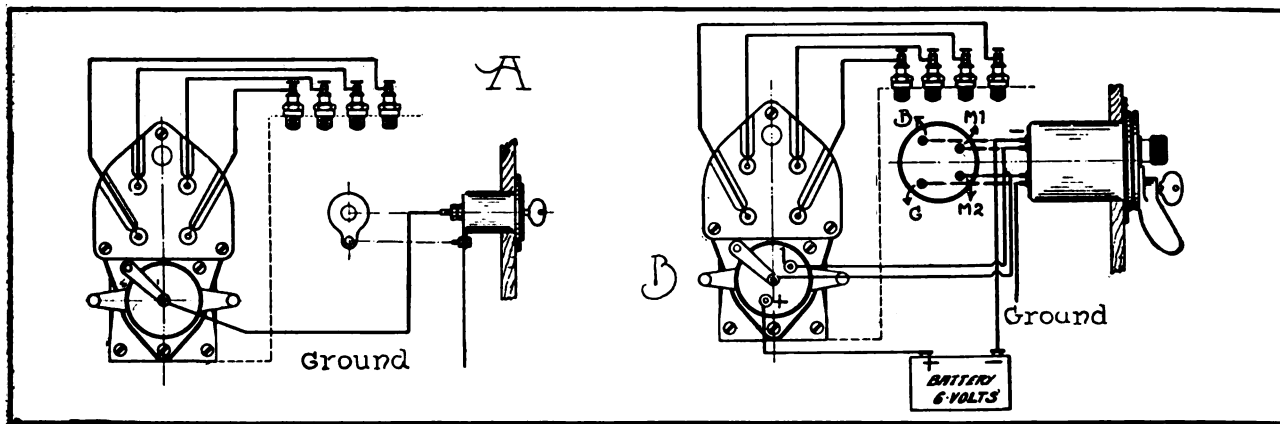


Fig. 3—Wiring Diagrams of Simms Magnets: A, Independent Type; B, Dual System—Note the Small Number of Leads with the Latter.

The vibrator will require attention only after long periods of service, due to its design and the use of very large contact points. To adjust the vibrator contact points it is not necessary to disassemble the switch, a screw for this purpose being provided in the centre of the push button. By inserting a pin, supplied with the switch, the cover plate may be turned one-quarter of a revolution and removed, exposing the mechanism. By slipping the spring locking ring out of place, the entire mechanism may be displaced, if desired. The only adjustment is to bring the contact points closer together, by the screw member as previously explained.

Wiring Plans.

The wiring plan of the dual system employed with a four-cylinder motor is shown at Fig. 3 B. It will be noted that the positive + terminal of the battery, a six-volt member, is connected to

under the magnets on the open type, or oil or dirt on contact points. The latter should be kept clean and no part of the circuit breaker mechanism lubricated, as oil will create troubles.

PREMIER REAR AXLE.

The Premier Motor Manufacturing Company, Indianapolis, Ind., gives the owner some good advice in its instruction book for the series X Premier machines. The company warns the motorist against attempting to improve the adjustment of the differential and drive pinion bearings, stating that the work was performed properly at the factory. Means are provided, however, for the purpose of taking up the wear and for disassembling and assembling. A knowledge of the rear axle will be of value to the owner in the event of an accident, etc.

A sectional view of the axle is shown at Fig. 4, with the components lettered. Three adjustments are provided—for eliminating end play of the drive pinion on its bearings; for moving the pinion, or meshing it with the bevel gear, and for moving the differential sideways.

Adjusting Differential.

The differential is accessible by removing the plates, and by using a large sized screw driver the differential clamp collar P can be manipulated. A plug W, when removed, permits of inspection of the mesh of the teeth of the pinion gear. The pinion adjusting sleeve S fits into milled slots in the sleeve, preventing its turning. All threads are standard right hand.

To adjust for a season's wear, for example: Set up the clamp collar T until all end play or thrust is eliminated from the pinion, but care must be exercised not to have the bearing too tight, else it will be ruined. Remove the plug S and, with the wrench provided for the work, screw the pinion adjusting sleeve U one 24th of a turn or one slot, which amounts to .003 inch advance of the pinion. Loosen the screw C of the clamp collar P and screw the collar away from the differential a part of a turn just enough to eliminate all of the end play, taking care that the bearings will not be subjected to undesirable stresses. Tighten all screws securely when the work of adjusting is completed. Do not loosen the clamp nut O when adjusting for wear, and allow no one except an expert to adjust for noises. The wear of the gear teeth increases the back lash, but this does no harm and causes no noise, and cannot be taken up without affecting the quietness of the gears.

Meshing Gears.

In adjusting the gears for noise the object desired is to set the gears relative to each other, both longitudinally and laterally, so that the pitch surfaces are exactly tangent, when the teeth will slide on and off each other without perceptible knock or jar. The pitch surfaces are imaginary surfaces, and their relation can only be guessed at by the sound of the teeth running together. As the teeth wear the back lash is of course, increased, but the imaginary pitch surface is unaffected, so it is evident that in adjusting for noise any notice of the back lash will only be misleading.

To remove the rear axle, jack up and place steadying supports under the frame just in front of the axle. Raise the frame until the wheels just clear the ground, then jack up the axle until the jacks carry its weight. Next remove the wire E and screws F from the spring seats and the bolts Y from the rear universal joint. If the axle is lowered to the floor it can be rolled out from beneath the car, the torsion rod slipping from its hanger near the rear of the transmission.

Displacing Wheels.

To remove the rear wheels, take off the hub cap and nut K with the special wrench provided for this work, and in place of the hub cap use the wheel puller which comes with each Premier car. Raise the axle until the wheel clears the ground and screw the large set screw of the wheel puller into the last named member, pushing the axle before it. If the wheel refuses to start, tap the head

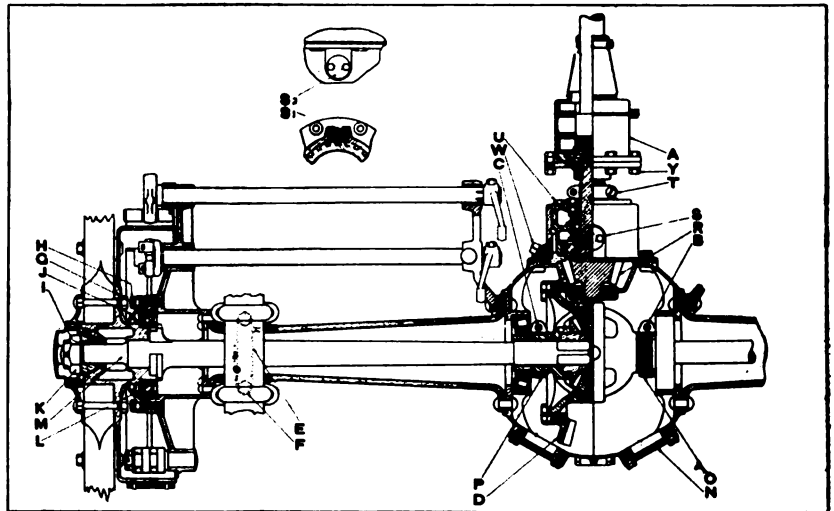


Fig. 4—Premier Rear Axle, with Components, Utilized in Adjusting, Lettered.

of the set screw with a hammer, and at the same time turn the screw.

Removing Wheels.

In replacing, the wheel is put on first and the tapered bushing I next. After making sure that the three-jawed clutch of the wheel is properly entered in the clutch of the axle shaft, tighten the nut K as snugly as possible. The nut should be secured with a good cotter pin. The nut K should also be retightened after the car has been run a short distance and the cotter pin should be replaced.

The axle shafts can be displaced after the wheels have been removed. Displace the wire H that holds the six screws G and the outside bearing cap J, and, using the axle itself as a ram, carefully jar the bearing from its seat. In replacing, be sure to rewire the screw G securely.

IN THE COMMERCIAL VEHICLE FIELD.

Plans Completed for Boston Truck Show, Only Exhibition of National Importance This Year—Motor Vehicles in Army Service—New Designs Announced.

BECAUSE of the importance of New England as an industrial centre and of the interest heretofore displayed by its business men in the mechanical transport, it is safe to predict that the third annual show of the Boston Commercial Motor Vehicle Association, which opens in Mechanics' building, Boston, the evening of March 17 for the remainder of the week, will prove a decided success from every viewpoint. As a matter of fact it will be the only exhibition of motor trucks and business wagons of national prominence this year, since the manufacturers, as represented by the National Automobile Chamber of Commerce, decided early last year to hold no display of this character either in New York or Chicago during 1914.

In effect the Boston motor truck show is a part of the annual Boston automobile show, which will close Saturday evening, March 14. The interval of practically three days is no more than sufficient to permit the removal of the large number of passenger vehicles on display this week, and arrange the commercial cars for inspection. These latter will be staged in the same setting as that which has occasioned so much favorable comment, and which is given more detailed consideration elsewhere in this issue.

Display on One Floor.

This statement needs slight modification, since the vehicles to be displayed in this second section will be found only on the first floor of the building. Thus the show will be confined to Exhibition and Grand halls, a plan which undoubtedly will meet with the entire approval of those who seek opportunity to compare the merits of the various makes and models.

Thus far it would appear that there were to be 32 different makes of machines on exhibition, but this number may be increased very materially before the doors actually open. It always has been true that there were many late comers, and there is some little evidence that this plan will be followed by several manufacturers this year. The present list practically includes only those vehicles represented by dealers in Boston, and contains 28 makes of gasoline cars, three of electric and one of steam. The management announces that it has reason to expect a total of at least 50.

As has been true of all of the automobile

shows held under the auspices of the dealers in Boston, this third annual exhibition of the Boston Commercial Motor Vehicle Association, which is composed of the dealers handling motor truck lines, will be under the direct management of Chester I. Campbell. The officials of the association are: President, J. S. Hathaway, representing White trucks; vice president, J. W. Maguire, Pierce-Arrow; secretary, Chester I. Campbell; treasurer, Day Baker, representing the G. V. electric line.

The list of exhibitors, as compiled to date, is presented below.

List of Exhibitors.

Abrams Company, Myer, 159 Vassar street, Cambridge, Mass. Lauth-Juergens one, two, three and five-ton trucks.

Alma Motor Truck Company, Alma, Mich. Two Republic one-ton wagons.

American Tire Company, 11 Suffolk street, Holyoke, Mass. Airless tires.

Autocar Company, 642 Beacon street, Boston. Autocar chassis, hotel bus and four delivery wagons.

Baker Motor Sales Company, 400 Massachusetts avenue, Cambridge, Mass. Two Selden one-ton wagons and one five-ton model.

Boyd, F. Shirley, 903 Boylston street, Boston. R. I. V. ball bearings, Multibestos brake lining, etc.

Bulck Motor Company, 15 Lawton street, Boston. Bulck chassis and four 1500-pound wagons.

Chase Motor Truck Company, Syracuse, N. Y. Chase 1500, 2500, 4000 and 6000-pound wagons.

Eldredge, W. E., 221 Columbus avenue, Boston. Couple-Gear electric trucks and Eldredge electric vehicles.

Fischer Company, C. J., 223 Massachusetts avenue, Cambridge, Mass. LaVigne light delivery cars.

Forbes, Walter J., 243 Columbus avenue, Boston. General line of motor truck accessories.

Fryer Company, Charles H., Providence, R. I. Tonneau windshield.

General Motors Truck Company, 753 Boylston street, Boston. GMC 2500-pound, two-ton and 3.5-ton gasoline vehicles and two and six-ton electric chassis.

International Harvester Company of America, Somerville, Mass. IHC wagons.

Kentling & Decker, Newton, Mass. Divine tires and Woodworth tire treads.

Kinney Manufacturing Company, 100 Boylston street, Boston. Kinney pressure distributor for dust laying and heavy asphalt road construction.

Kelly-Springfield Motor Truck Company, Cambridge, Mass. Kelly one, two, 3.5 and five-ton trucks.

Knox Automobile Company, 885 Boylston street. Knox six-cylinder, triple combination hose, chemical and piston pumping engine; four-cylinder combination hose and chemical wagon; Knox-Martin tractors with capacities of 5-6 and 7-20 tons, and for fire department service.

Little Giant Motor Truck Company of Boston, 221 Columbus avenue, Boston. Little Giant one-ton wagon.

Linscott Motor Company, 163 Columbus avenue, Boston. Reo light delivery, 1500-pound and one-ton wagons.

Locomobile Company of America, 700 Commonwealth avenue, Boston. Two Locomobile five-ton trucks and a chassis.

Maddocks, H. Ross, 175 Pleasant street, Boston. Three Stewart trucks with capacity of 1500-2000 pounds and a chassis.

Magill, W. F., 58-60 Brookline avenue, Boston. Universal, 1.5, three and five-ton trucks.

Maguire Company, J. W., 745 Boylston street, Boston.

Three Pierce-Arrow two-ton and three five-ton trucks.

Mattapan Motor Car Company, Mattapan, Mass. Atterbury, 1500, 3000 and 6000-pound wagons.

Milliken, E. H., 68 West Rutland street, Boston.

Myers Bros., New York City. Novelties.

Packard Motor Car Company of Boston, 1089 Commonwealth avenue, Boston. Packard two, three, four, five and six-ton chassis.

Palmer-Moore Company, Syracuse, N. Y. Palmer-Moore 1600-pound wagon.

Parcel Post Equipment Company, 20 Green street, Cambridge, Mass. Parcel post wagons.

R. & L. Company, 915 Boylston street, Boston. Garford two-ton chassis, Garford three and six-ton trucks, Willys Utility chassis.

Rockwell, Inc., C. P., 640 Commonwealth avenue, Boston. Jeffery 1500 and 2000-pound wagons.

Sewell Cushion Wheel Company, Detroit. Special wheels.

Spedolene Lubricant Company, 14 James street, Malden, Mass. Spedolene lubricants.

Stanley Motor Carriage Company, Newton, Mass. Stanley steam 1000, 1500 and 2000-pound wagons and 12-passenger mountain wagon.

Twombly Car Corporation, Avondale, N. J. Twombly light delivery wagon.

Velle Motor Vehicle Company, 16 Amherst street, Cambridge, Mass. Velle one, two and three-ton trucks.

Walter Motor Truck Company, New York City. Walter five-ton front drive chassis.

White Company, 930 Commonwealth avenue, Boston.

reached the Detroit offices of the company in January, and this has now been filled.

No statement has been made by the military officials of Portugal as to the uses to which these machines have been put, but it is believed that they are employed in general transportation service for the army.

KEETONS FOR ARMY WORK.

Maker Supplies Fleet as Part of Hospital and Field Service Equipment.

Although the American Voiturette Company, Detroit, maker of Keeton and Car-Nation cars, is not actually engaged in the production of commercial vehicles, it is interesting to note that it has received substantial recognition from the United States military officials, in that it recently was requested to supply a fleet of Keeton cars for



Fleet of Keeton Cars Recently Supplied to United States Army for Hospital and Field Service.

Four White 1500-pound wagons, 3000-pound wagon, three and five-ton trucks, five-ton dumping truck and patrol wagon.

FEDERAL TRUCKS IN PORTUGAL.

Detroit Manufacturer Has Placed 17 Machines with War Department.

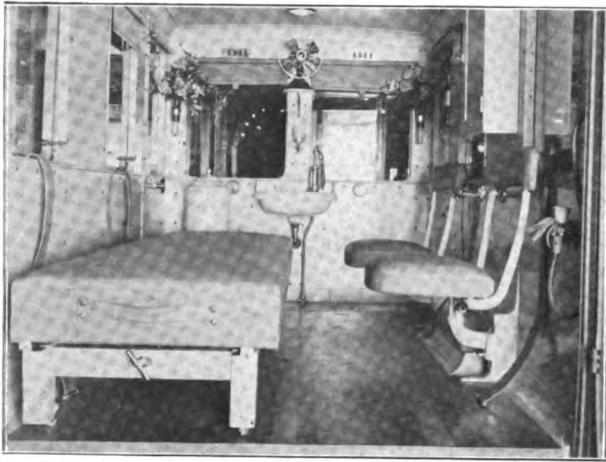
Since March 3, 1913, the Federal Motor Truck Company, Detroit, has placed 17 of its Federal one-ton trucks with the War Department in Portugal. The first machine was ordered a year ago, the idea being to experiment with it and determine its practicability for military service. Evidently, these experiments proved satisfactory, as four more were ordered in September.

Before this second order could be filled, a third, this also being for four, was made in October, and soon afterward, still another order for four machines was received. The fifth order

hospital and field service. An accompanying illustration shows some of these machines ready for duty.

H. H. Newsom, vice president and general manager of the company, states that he has been informed by army men that the French type of construction employed in Keeton cars, with radiator incorporated with the dash, offers peculiar efficiency in army manoeuvring. This is held to be particularly true in crossing ditches and unusually rough country, inasmuch as this placing of the radiator protects it from injury.

It is added that the selection of the Keetons was made only after the most rigorous tests, and the company considers the approval of such exacting judges as army experts the best possible tribute its product could have. It will be noted, from examination of the picture, that these vehicles differ from the standard pleasure car construction, at least in the matter of tire equip-



Interior of Willys Utility Invalid Coach, Showing Attractive Arrangement of Fittings.

men, these being solid rubber blocks, and, of course, in the body installation.

HANDSOME INVALID COACH.

Attractive Body Installation on Willys Utility Chassis for Cleveland Client.

Accompanying illustrations present a handsome invalid coach, or ambulance, recently produced for a client of the Overland-Garford Sales Company, 6604-18 Euclid avenue, Cleveland, O., by the Willys-Overland Company in the old Gramm Motor Truck Company's plant at Lima, O. The chassis is that of a Willys Utility wagon of 1500 pounds capacity, but body work is of special design, and since it is somewhat more elaborate than that of the ordinary ambulance the term invalid coach appears to be more fitting.

The compartment shown in the smaller of the two illustrations is located back of the driver's seat, and entrance to it is by large double doors at the rear, or by a single door at the side as indicated in the larger picture. It will be noted that the invalid's cot and the two chairs for attendants have been designed and constructed with a view to providing the utmost comfort for the occupants. The other appointments include provision for running water, water cooler, wash basin, electric fan,

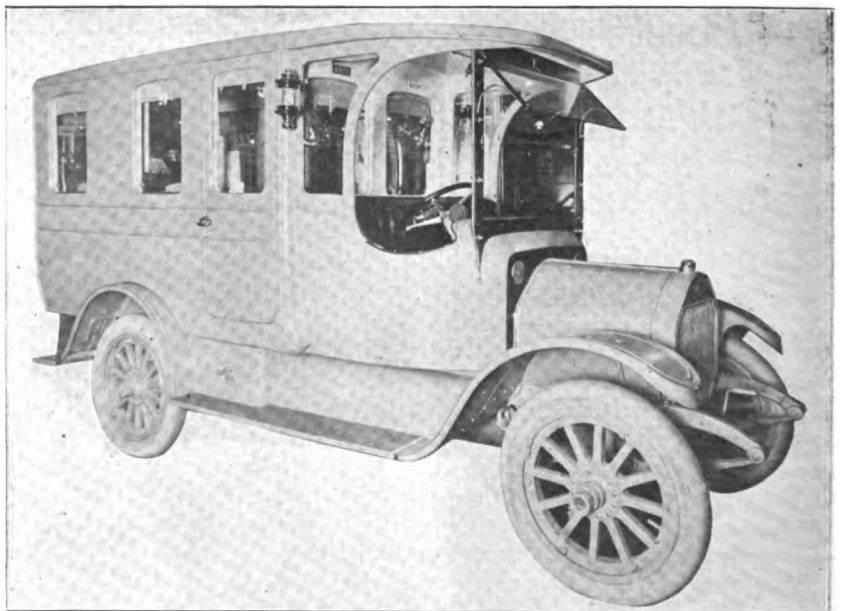
hot air heat, medicine cabinet, stretchers, sashless drop windows, etc.

The chassis is equipped with a four-cylinder motor, with cylinders cast singly, the bore being four inches and stroke 4.5. This gives a horsepower rating of 25.60 under the S. A. E. formula, but the maker claims it will develop 30 at normal speed. Cooling is by thermo-syphon, ignition by Remy magneto, and lubrication by a self-contained pressure feed system. The clutch is a cone, leather faced, and the selective sliding gear transmission affords three forward speeds and reverse. Brakes are external contracting on the jackshaft, operated by pedal, and internal expanding on the rear wheel drums, actuated by lever. Springs are semi-elliptic, the front members being 45 inches long by 2.25 wide, and the rear, 50 inches long by 2.5 wide. The front axle is an I beam section and the rear, a rectangular section, both utilizing Timken bearings. The standard wheelbase is 120 inches, and the tires, 36 by 3.5 inches.

INTERESTING OMNIBUS BODY.

Maker of Adams Truck Is Prepared to Fit This Type to Its Two-Ton Chassis.

In an effort to provide a practical type of omnibus body that may be available for such service in town and country, the Adams Bros. Company, Findlay, O., has recently produced the 28-passenger vehicle presented in an accompanying



Handsomely Appointed Invalid Coach Body, Fitted to Willys Utility Chassis, Indicating Entrance to Interior at the Side.

illustration. This is fitted to a model E two-ton Adams chassis, made by this concern, the chief departure from standard practise being the lengthening of the wheelbase to 160 inches, to insure the desired stability.

It will be noted that seven seats are provided, each accommodating four people. The space between these is held to be sufficient to permit easy movement of the passengers in entering and leaving, and their comfort is still further assured by the use of substantial leather upholstery. At either side are running boards that are dropped in sections, that portion above the rear wheels being practically at the height of the frame. This arrangement is held to make for extreme convenience.

The roof is of the canopy type, being considerably wider than the seats, and extending backward from a line with the dash with considerable overhang at the rear. This is supported on 10 steel stanchions, five at either side, and affords protection from the sun. In case of storm, ample curtains are arranged so as to be dropped at the sides and ends.

The Adams two-ton chassis is equipped with a four-cylinder, water-cooled motor of the L head type, the cylinders being cast en bloc with bore of 4.125 inches and stroke of 5.25. This gives a rating of 27.25 horsepower under the S. A. E. formula, but the maker's rating is 35. Ignition is by Eisemann magneto. The clutch is a dry disc construction, and the selective, sliding gear transmission affords three forward speeds and reverse. As with all Adams chassis, the radiator is incorporated with the dash, and provision is made for lifting the hood from the front, so as to afford maximum accessibility to the engine.

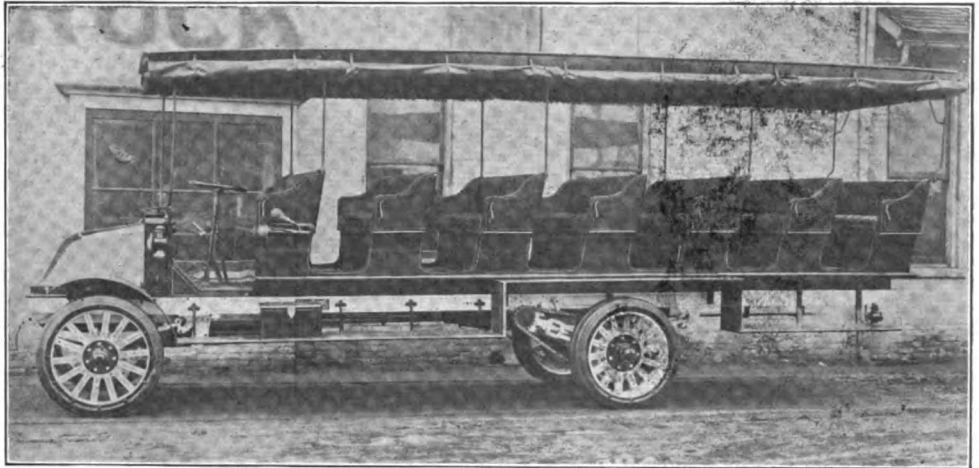
URBAN ELECTRIC TRACTOR.

Kentucky Wagon Company Produces Machine of Three Tons Haulage Capacity.

Announcement is made by the Kentucky Wagon Company, Louisville, Ky., that it is pro-

ducing an electric tractor with haulage capacity of three tons. This is in addition to the types of electric service wagons manufactured by this concern. The machine is designed to operate in limited space, and has wheelbase of 58.25 inches, although the total length is 154.75 inches, there being an extension at the rear on which the front end of a load carried on a two-wheel reach is supported.

The motor is a General Electric type 1022, rated at 85 volts, 40 amperes, and 1200 revolutions a minute. This is installed transversely in the pressed steel frame just back of the rear axle. The battery, consisting of 44 17-plate Hycap-Exide M. V. cells, is carried on top of the chassis, the forward end of the box supporting the driver's seat. Power is transmitted from the sprocket end of the armature shaft by a Morse silent chain to a sprocket incorporated with the



Adams Two-Ton Chassis, Equipped with 28-Passenger Omnibus Body.

differential assembly of the jackshaft, and final drive is by side chains.

The controller is a continuous torque type, installed in a case in front of the driver, and it affords four forward speeds and two in reverse. Semi-elliptic springs are employed. The front axle is an I section and the rear, rectangular. The wheels are 32 inches in diameter, fitted with four-inch tires. The brake, operating on the rear wheels, is actuated by pedal.

It is maintained that the tractor may be turned in a radius of 15.5 feet. The platform, on which the end of the load is carried, is mounted on a pivot on the frame extension, and the tractor can be driven so that the load when carried on two wheels can be turned in practically its own length. A rope fitted under the extension has a hook at one end, which fastens into the binding chain on the trailer and serves to tow the load.

BECOMES VICE PRESIDENT.

Well Known Consulting Engineer Becomes Identified with Cleveland Concern.

The many friends of Henry Souther throughout the industry will be interested to learn that he has identified himself with the Ferro Machine & Foundry Company, Cleveland, O., and has been elected vice president of that concern. Mr. Souther's experience with the industry has been of the broadest, and he has acted as consulting engineer for a number of years. More recently his work has involved questions of management and system, sometimes leading directly to the field of efficiency engineer.

Mr. Souther graduated from the Massachusetts Institute of Technology in 1887, and began his business and professional career with the Pennsylvania Steel Company, Steelton, Penn. In 1893 he left that concern to become engineer for the Pope Manufacturing Company, Hartford, Conn., in which city he



Henry Souther, Vice President, Ferro Machine & Foundry Company.

opened offices as an independent consulting engineer in 1899. It was in this capacity that he became prominent in connection with the automobile and allied industries, and later as consulting engineer for the Association of Licensed Automobile Manufacturers during the life of that organization. He was president of the Society of Automobile Engineers in 1911.

SHOW IN TIFFIN, O.

Dealers Make Display of Season's Models Amid Japanese Surroundings.

The fourth annual automobile show in Tiffin, O., was held in the Auditorium, March 4-7, and

the interest displayed by the people of that city and vicinity was such as to warrant the dealers in anticipating a decidedly successful year. The interior of the building was made to represent a Japanese garden, several hundred Japanese lanterns being distributed about the wistaria covered lattice work with which the main hall was decorated.

The list of exhibitors, while not so long as in many of the cities of the Middle West, was such as to afford the visitors ample opportunity to inspect the models represented in Tiffin. Among the cars on display were the following: Reo, Mitchell, Paige, Maxwell, Allen, King, Studebaker, Chevrolet, Krit, Regal, Ford, Buick, Parlin-Palmer, Hudson, Overland, Jeffery, Paterson, Empire, Stearns-Knight, Hupmobile, Saxon, Ohio electric and Tiffin, Krebs and Buick trucks.

ANOTHER MERCER RECORD.

Pullen's Speed for 300 Miles Exceeded That Made by Tetzlaff in a Fiat.

It was made plain, in the report of the recent Grand Prize race in Santa Monica, Cal., that Pullen in a Mercer had created a new speed record for this event. It appears, however, that the performance of the Mercer in this contest was even more interesting than would appear from this statement.

It is somewhat well known that the world's road racing record is held by Teddy Tetzlaff, who drove a Fiat car at a speed of 78.5 miles an hour over this same course in May, 1912. Tetzlaff covered but 303 miles, while Pullen's Mercer went 403 miles at a speed of 77.29 miles an hour. According to W. A. Smith of the Mercer Automobile Company, Trenton, N. J., Pullen's average speed for the first 300 miles of the race was 79 miles an hour. This is particularly interesting, in view of the fact that the Mercer is a much smaller car than the Fiat.

APPOINTS SIX REFEREES.

Federation of American Motorcyclists Preparing for the Racing Season.

John L. Donovan, 819 Ashland block, Chicago, Ill., chairman of the competition committee, Federation of American Motorcyclists, announces the appointment of the following local referees for the season of 1914: Ray E. Reed, Jacksonville, Fla.; William F. Hellman, St. Louis, Mo.; John Hohl, Phoenix, Ariz.; William



First Marmon Car, Produced in 1902 and Still in Use on the Road.

C. Voss, Peoria, Ill.; William J. Hall, Montgomery, Ala.; Roy S. Pascal, Newark, N. J. It is probable that others will be named as the season advances.

In connection with these appointments, Chairman Donovan makes the request that those who are planning to hold meets during the coming season communicate with him at once, in order that there shall be no delay with respect to granting sanctions or attending to other necessary matters. He announces his desire to cooperate with clubs and promoters, and asks that they assist him in every way possible.

ALPHA AND OMEGA OF MARMON.

First Car Produced by Nordyke & Marmon Company Still in Active Service.

Accompanying illustrations present the alpha and omega of Marmon cars, made by the Nordyke & Marmon Company, Indianapolis, Ind. The older machine was the first produced by this concern in 1902, while the other picture shows the latest model 41.

This original Marmon car has had a decidedly eventful history. The company was established in 1851, and had gained a reputation in manufacturing fields before the time of its decision to enter the new industry. This car was regarded as a very beautiful creation, and, it may be added, it possessed a number of original features which were destined to represent the accepted standards of the modern automobile.

It was one of the first to have

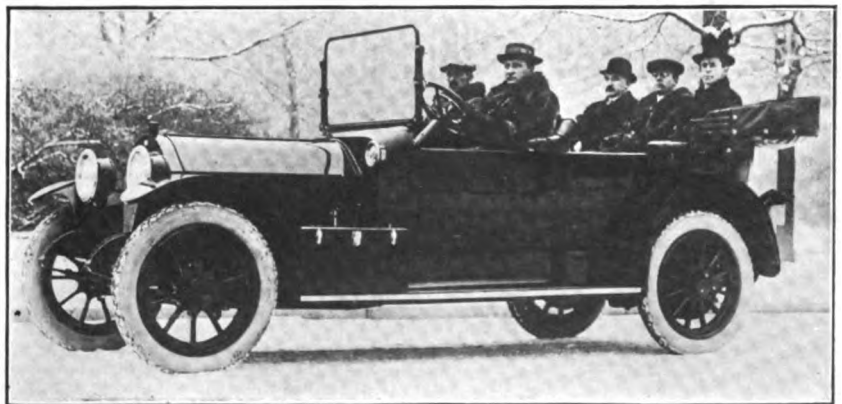
a side door entrance to the tonneau, selective transmission, affording three forward speeds and reverse, multiple disc clutch with cork inserts, double brakes operating through equalizers, circulating lubrication system, hollow crankshaft, pressed steel frame, tilted steering wheel, etc.

This car originally had a water-cooled, two-cylinder motor, but in 1905 this was replaced by a six-cylinder, air-cooled unit, said to be one of the first six-cylinder engines installed in this country. This motor is still in

good working order, as is evidenced by the fact that it was operated the day this photograph was taken. In the picture, Howard Marmon, president of the company, is at the wheel; at his left is H. H. Rice, sales manager; in the centre of the tonneau is C. C. Hanch, treasurer; on his right, H. C. Shafer, factory superintendent, and on his left, F. E. Moskovics, commercial manager.

The other picture shows F. E. Wing, president of the F. E. Wing Motor Car Company, Boston, Mass., at the wheel of the new light six. He had but recently returned from an extensive tour of New England with a party of friends.

The necessity for larger space and better facilities for handling their increased business has compelled the branches of the H. W. Johnson-Manville Company in Indianapolis, Ind., and Louisville, Ky., to seek new quarters. The former is now located at 408-410 North Capitol avenue and the latter at 659-661 South Fourth avenue. Both of these will include ample warehouse accommodations and service departments.



F. E. Wing and Party of Boston Men in the Latest Marmon Model 41.

NEWS OF THE MANUFACTURER AND DEALER.

The following concerns have been incorporated recently to manufacture or deal in motor vehicles, accessories, etc.:

Elastro Company, Syracuse, N. Y.; \$30,000; to manufacture and deal in compounds for use on tires.

Strite Tractor Company, Minneapolis, Minn.; \$100,000; to build light weight tractors; George T. Strite, Howard J. Bierman, J. S. Clapper, Frank J. Bierman.

American Electrical Company, Portland, Me.; \$1,500,000; to manufacture and deal in electrical and mechanical devices of all kinds, also automobiles and parts.

The Dodge Motor Car Company, Detroit, Mich.; \$1,000,000; to manufacture two-passenger light cars.

Texas Climatic Manufacturing Association, San Antonio, Tex.; \$200,000; to manufacture what will be known as the "Climatic home-grown tires".

Lubricator Company, New York City; \$100,000; to manufacture lubricators for automobile engines; L. R. Balck, David C. Thomas, William C. Ottiwell.

Petty Dirigible Auto Headlight Company, Salt Lake City, Utah; to manufacture headlights.

Universal Lubricants Company, Wilmington, Del.; \$100,000; to manufacture automobile supplies; J. F. Curtin, C. E. Eaton, J. M. Satterfield.

Gay-Streiblich Auto Wheel Company, Little Rock, Ark.; \$125,000; to manufacture a patented automobile wheel.

Willys-Overland Company, Hamilton, Ont.; \$500,000; to manufacture automobiles; J. N. Willys and others.

Brandtjen Motor Car Company, St. Paul, Minn.; \$50,000; to buy, sell and deal in automobile parts and accessories; Henry A. Brandtjen, A. C. Brandtjen, M. L. Brandtjen.

Old Dominion Tire Corporation, Norfolk, Va.; \$10,000; to manufacture automobile tires; J. E. Guy, B. S. Joyner.

Auto Stock Company, Detroit, Mich.; \$50,000; self-starters; William J. Fisher, John Olsen, Mansell Hackett, Fred M. Guy.

Bodock Gasoline Company, Ponca, Okla.; \$50,000; to manufacture gasoline from casing head gas; George L. Miller and others.

Hall-Scott Motor Car Company, San Francisco, Cal.; \$100,000; to manufacture, sell and deal in motor engines.

Amper Control Corporation, Buffalo, N. Y.; \$100,000; to manufacture automobile and engine accessories; E. W. Jones, R. E. Heard, L. C. Kinnlus.

Conway Machine & Garage Company, Boston, Mass.; \$5000; A. E. Stoddard, Albert C. Lary, H. H. Sylvester.

Heeb Auto & Garage Company, Cincinnati, O.; \$10,000; C. M. Heeb, V. Heintz, L. B. Davison.

Associated Garages, New York City; \$110,000; Ira B. Lothrop, Elleen T. Levy, Howard B. Alexander.

North Woodward Garage Company, Detroit, Mich.; \$2500; Maud Brosch, Edwin Brosch, Fred A. Bowers.

Lupfer-Prather Garage of Kissimmee, Kissimmee, Fla.; \$5000.

National Garage Company, Everett, Mass.; \$5000; Frank P. Anthony, Harriet C. Partridge.

Storm King Garage, Cornwall, N. Y.; \$1000; James Lewis, Edward C. Townsend, William Wells.

College Garage Company, Los Angeles, Cal.; \$10,000.

Mount Hope Garage Company, Mount Hope, W. Va.; \$10,000; W. S. Johnson, J. F. Grimet, W. H. Darnell and others.

The 127th Street Garage, New York City; \$5000; W. F. Bullman, G. M. Stevens, H. L. Holly.

Dupre Automobile Company, Columbia, Ga.; \$15,000; to conduct a general automobile and garage business.

Thornton's Garage & Livery Company, Attica, Ind.; \$1000; D. R. Thornton, L. C. Thornton, M. Holmes.

Collingwood Garage Company, Toledo, O.; \$10,000; to conduct a general taxicab business; C. Lemster, O. L. Rankinson, K. S. Lemster, B. Decker, C. L. Deeds.

Hot Springs Garage, Hot Springs, S. D.; \$15,000; James Marty, John S. Fusion, E. R. Juckett.

Eagle Auto Transfer Company, Chicago, Ill.; \$15,000; to operate a garage.

GARAGE AND DEALER.

H. F. Silverthorn, Orfordville, Wis., is making preparations to enter the automobile business, and will convert his general store into a salesroom.

O. P. Coppedge, Pittsburg, Tex., who has been man-

ager of the Pittsburg Auto Company, has withdrawn and will go into business for himself.

The Rutland Motor Company, Ottawa, Ill., has changed its name to the Ingram Motor Company. It now has offices and salesrooms in Rutland, Peoria, Bloomington and Springfield.

William Herron and **Frank Dusenbury**, New Hackensack, N. Y., have opened a new welding plant.

The Phoenix Automobile Supply Company, St. Louis, Mo., has absorbed the Continental Equipment Company. John F. Shuford, manager of the latter, has been made general manager of the consolidated business.

Raoul Sayres, Marengo, Ia., has purchased the interest of W. Ince in the firm of Bishop & Ince. Mr. Ince will retire from the business.

The Automobile Service Association, Philadelphia, Penn., has sold its building at 5123 Swanson street and may locate in a different section.

G. A. Rickenbaugh, Sault Sainte Marie, Mich., has purchased the interest of Walter W. Dennis in the Lock City Auto Company. The company is engaged in a general repairing, overhauling and painting business.

The Winckler Engineering Company, Racine, Wis., a firm of automobile consulting engineers, has been dissolved.

The Louisville Lozier Company, Louisville, Ky., has filed amended articles of incorporation changing the name to the Louisville Automobile Company.

Lattig Bros., Atlanta, Ia., has purchased the business of the Anita Automobile Company.

Wand & Bossard, Beach, N. D., has dissolved partnership. Mr. Wand will continue the business alone.

The McDuffee Automobile Company, Chicago, has absorbed the KisselKar agency in that city. The company now handles four lines, Peerless, KisselKar, Howard and Rauch & Lang.

The Allerton Automobile Company, Allerton, Ia., has purchased the B. & Mc. Automobile Company. The company handles the Chalmers, Buick, Oakland and Ford cars.

Jones & Indra, Green Bay, Wis., which conducted the West Side garage, has dissolved partnership, Carl Jones becoming sole owner. The business will be conducted under the old name and the same line of accessories will be handled. The repair shop is to be overhauled and new machinery installed.

William F. Klatt, Detroit, has purchased the two-story solid brick garage at 3087 East Grand boulevard, for a consideration approximating \$40,000. The building was formerly occupied as a factory and garage by the Wahl Motor Company. The size of the lot is 104 by 100 feet. Mr. Klatt will continue it as a garage, although he will not be active in its management.

Call Bros., Salt Lake City, Utah, has purchased the interest of H. S. Harpster in the Harpster-Baldwin-Call Company on Eighth street. A modern garage will be established.

J. Nichols, Syracuse, N. Y., has taken over the truck end of the Selden business in eight counties. Mr. Nichols is an automobile top manufacturer.

The Hotel Brown Garage, Middletown, N. Y., has been changed to the Post Garage Company, Inc., owing to a change being made in the name and ownership of the hotel, which will be known as the Mitchell Inn. As soon as weather conditions permit a 20 by 40-foot addition will be built to afford more space for storage and the entertainment of tourists. A large machine shop is already in operation.

The United Motor Company, Battle Creek, Mich., has taken over the agency for Ford cars, formerly handled by the American Motor Company.

Ralph Hill, Little Genesee, N. Y., has purchased an interest in the Stevens garage. The business is to be much enlarged and other improvements are contemplated.

H. F. Shaw, Pittsfield, Mass., now operates an exchange for second hand Ford cars, as well as handling the Maxwell cars and Little Giant trucks. Mr. Shaw is located at 983 Dalton avenue.

The Stephenson Taxi Company, Crawfordsville, Ind., of which R. R. Stephenson is manager, has opened for business. The headquarters are on South Washington street.

The Richards Automobile Company is the name of a

new automobile company operating at Black River Falls, Wis.

Harry B. Hartley, Waltham, Mass., has opened an automobile business in that city, as well as conducting the Boston store. He will carry a full line of accessories and supplies.

Allen & Hardy, Monticello, Ark., has opened a supply store. A full line of automobile accessories and supplies will be carried.

Emil Burch, E. E. Rhine and V. K. Robinson have formed the Auto & Sight Seeing Company, at Miami, Fla., with headquarters in the Hippodrome newstand. The equipment consists of 20 cars.

L. J. Hadley and E. O. Merchant, Minneapolis, Minn., have entered a partnership to handle the Menominee trucks, and will be located at 49 10th street.

The Roberts-Toledo Automobile Company, Toledo, O., has taken the agency for the Sherwood automobile trailer.

The Huston-Hanger Auto Sales Company, Washington, D. C., has opened a salesroom at 1119 14th street.

Charles W. Tway, Birmingham, Ala., has opened salesrooms at Avenue D, where he will show Haynes cars.

James Mudie, Des Moines, Ia., is about to branch out for himself and will establish a battery repair business at 413 12th street.

The Shauble-Ferguson Company, Erie, Penn., is the name of a new company which has been formed to handle the Allen car. A salesroom has been opened at 260 East 18th street in charge of R. G. Ferguson. Mr. Ferguson has been in the automobile business for a number of years.

The Commerce Motor Car Company of Illinois, the state sales branch of the Commerce Motor Car Company, Detroit, maker of Commerce business wagons, recently entertained the dealers and sub-dealers throughout that state at a dinner in the Sherman house, Chicago. The purpose of the gathering was to promote the spirit of co-operation and to discuss matters pertaining to the sale of machines in that section. Several executives of the parent company were in attendance.

George Wagner, who has been employed as a tire repairman in Grand Rapids, Mich., for some time, has formed the Central Vulcanizing Company and has located at 228 Ottawa avenue. Mr. Wagner will stock all standard tires and accessories.

The Albia-Ford Company, Albia, Ia., is the name of a new company which was formed to handle Ford cars in that city and vicinity. The new concern is located in the Elder building, recently vacated by the Snow Auto Company. H. J. Longaker is the manager.

WITH THE MANUFACTURERS.

The Croxton Motor Car Company, Washington, Penn., has sold its stock to the Universal Motor Company, and the latter company will manufacture the Universal car.

The F. & H. Wire Wheel Company, Columbus, O., has brought out a new rim for automobile wheels adapted for the use of wire spokes. The factory is at 1432 Parsons avenue.

The Motor Car Spring Company, New York City, is to engage in the manufacture of screw machine products, gas savers and other parts for automobiles and motorcycles.

The Belknap Wagon Works, Grand Rapids, Mich., is preparing to increase its line by making bodies for motor trucks, these being designed and constructed to order.

Gray & Davis, Boston, Mass., has completed arrangements by which its lighting and starting outfits will be sold throughout Europe by the Allgemeine Elektrizitäts

Gesellschafts of Berlin, Germany, commonly known as the A-E-G Company.

Hertz & Co., New York City, is producing a four-cylinder magneto, intended for cyclecar use, and a very compact distributor for battery ignition systems.

The Lovell-McConnell Manufacturing Company, Newark, N. J., is offering to the cyclecar trade the Klaxet, the smallest electric horn, and the new hand-operated Klaxon.

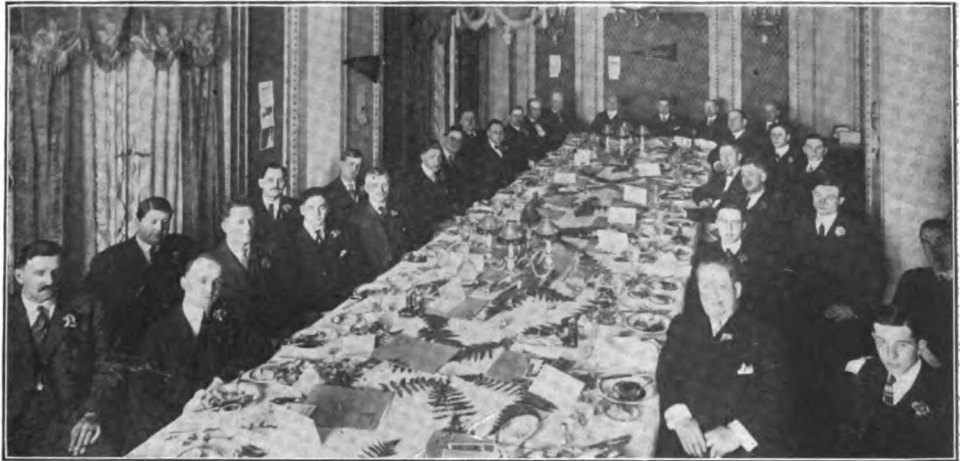
George McCadden, St. Cloud, Minn., is organizing a company to manufacture the piston ring recently invented by him. The company will have \$50,000 capital and will lease a building in Minneapolis. Mr. McCadden is proprietor of the McCadden Machine Works.

The New Process Gear Corporation, Syracuse, N. Y., is erecting a three-story, concrete and steel building, 40 by 100 feet, to provide additional facilities for spur and bevel gear work. The new building is to be absolutely fireproof, with brick curtain walls and concrete floors, and will contain entirely new equipment.

Janney, Steinmetz & Co., Philadelphia, manufacturer of the well known Jasco seamless steel, leakless gasoline tanks, is producing these tanks in sizes and shapes suitable for cyclecar productions.

The Pennsylvania Shafting Company, Westchester, Penn., will erect a new plant for the manufacture of Wright taper roller bearings for automobiles. The cost is estimated at \$150,000. The new structure will adjoin the present plant.

The Rubber Goods Supply & Manufacturing Company,



Recent Dinner Tendered to State Dealers and Sub-Dealers by Commerce Motor Car Company of Illinois.

Akron, O., has changed its name to the Excel Rubber Company. The company is located at 32 West State street, and produces tire accessories.

The Jeffery-Dewitt Company, Detroit, manufacturer of spark plugs, has erected a large addition to its factory No. 3 at Butler avenue and the Grand Truck railroad. The building will be devoted to the first operation in making the porcelains for the plugs.

The Menominee Electric Manufacturing Company, Menominee, Mich., has developed a line of lighting generators for use in connection with cyclecars and is now making shipment.

The Motor Products Company, Chelsea, Mich., will manufacture a V shaped two-cylinder motor for the cyclecar trade, and will shortly be shipping 50 motors daily. The American Distributing Company, Jackson, Mich., will market the output.

The National Forging Company, Hamilton, Ont., has taken over the plant of the Swift Motor Car Company, and will use it for the production of automobile and carriage forgings.

The American Ever Ready Company, New York City, has purchased an entire block in Long Island City, upon which will be erected an eight-story factory, 200 by 300 feet.

The V-Ray Company, Marshalltown, Ia., at its recent annual meeting, trebled its capital stock. Dwight H. Denmead acquired one-third interest in the company. Mr. Sinclair and Mr. Hansen each owning a third interest.

RECENT PATENTS.

Windshield, Richard A. Brine, Boston, Mass.: No. 1,087,104. Filed Oct. 3, 1910.

Multiple-Cylinder Engine, Frederick R. Sunderman, Newburgh, N. Y., assignor to Sunderman Safety Carburetor Company, same city; No. 1,087,151. Filed April 6, 1912.

Power Tire Pump, Joseph H. Templin, Philadelphia, Penn.: No. 1,087,201. Filed May 3, 1912.

Vehicle Trailing Device, Don C. Bryan, San Diego, Cal.: No. 1,087,210. Filed May 24, 1912.

Packing Ring, Edward B. Campbell, St. Louis, Mo., assignor to Sta-Tite Packing Ring Company, same city; No. 1,087,213. Filed July 28, 1913.

Resilient Wheel, John J. Fahrney, Timberville, Va., assignor of one-third to John P. Burke, Harrisonville, Va.; one-sixth to John T. Helbert and one-sixth to Frank H. Driver, Timberville; No. 1,087,226. Filed Jan. 11, 1913.

Vehicle Jack, Edward W. McCarroll, Pittsburg, Penn.: No. 1,087,250. Filed July 7, 1913.

Armor for Pneumatic Tires, Charles Matson, Elizabeth, N. J., assignor of one-half to Ernest Huch and one-half to Rudolph Burkart, Aldene, N. J.; No. 1,087,312. Filed Nov. 4, 1912.

Sleigh Attachment for Motor Vehicles, Halvor E. Hoines, Lake Park, Minn.: No. 1,087,372. Filed April 7, 1913.

Lubricating Means for Two-Cycle Engine, Hermann Lemp, Lynn, Mass., assignor to General Electric Company; No. 1,087,387. Filed April 19, 1913.

Resilient Wheel, Robert A. Nicholson, Russellville, Okla., assignor of one-half to A. S. Nelson, Oklahoma, Okla.; No. 1,087,391. Filed Feb. 19, 1913.

Motorcycle Saddle, Philo G. Olds, Elyria, O.: No. 1,087,393. Filed Aug. 9, 1913.

Muffler, Otto F. Person, Erie, Penn., assignor to General Electric Company; No. 1,087,398. Filed Sept. 14, 1912.

Automobile Lock, John F. Hicks and Philip Kovsky, Philadelphia, Penn.: No. 1,087,446. Filed June 3, 1913.

Control Device for Motor Starters, Alden L. McMurtry, Sound Beach, Conn.: No. 1,087,454. Filed Jan. 31, 1912.

Compressed Air Starting Device, Malcolm P. Ryder, Springfield, Mass.: No. 1,087,465. Filed Feb. 14, 1912.

Vehicle Wheel Rim, Edwin Coupland Shaw, Akron, O., assignor, by mesne assignments, to B. F. Goodrich Company, same city; No. 1,087,467. Filed May 25, 1907.

Resilient Tire, Henry Wellstead, Evanston, Ill., assignor of one-half to M. Paul Noyes, Chicago, Ill.; No. 1,087,474. Filed Oct. 24, 1908.

Lamp Turning Mechanism, Nelson Maxfield, Malone, Tex.: No. 1,087,501. Filed Dec. 5, 1912.

Vehicle Spring, Morris A. Schuster, Oakland, Cal.; No. 1,087,512. Filed May 24, 1913.

Fender, Jokshan F. Whitmann, St. Louis, Mo.: No. 1,087,521. Filed Dec. 26, 1912.

Detachable Rim, Hugo C. Gibson, New York City, assignor to Firestone Tire & Rubber Company, Akron, O.; No. 1,087,534. Filed March 17, 1908.

Horn, Miller Reese Hutchinson, New York City, assignor to Lovell-McConnell Manufacturing Company; No. 1,087,538. Filed Dec. 7, 1909.

Four-Seated Closed Body, Harold H. Kennedy, Indianapolis, Ind., assignor to Waverley Company, same city; No. 1,087,540. Filed Aug. 12, 1912.

Combination Tail Light, License Plate and Holder, Elmer E. Poole, Boston, Mass. No. 1,087,548. Filed April 2, 1912.

Vehicle Brake, Charles Reiner, Philadelphia, Penn.: No. 1,087,553. Filed Aug. 30, 1913.

Internal Combustion Engine, Hugo J. Bachman, Denver, Col.; No. 1,087,566. Filed Jan. 28, 1913.

Demountable Rim, Joseph Augustus Anglada, New York City, assignor to Anglada Corporation; No. 1,087,628. Filed Dec. 13, 1911.

Gasoline Strainer, Liel W. Short, Boston, Mo.; No. 1,087,692. Filed June 18, 1913.

Elastic Metal Tire, Gustav Emil Dargatz, Kansas City, Mo.; No. 1,087,731. Filed Jan. 24, 1912.

Attachment for Car Roofs, Georg Frentzen, Aachen, Germany; No. 1,087,753. Filed April 10, 1913.

Timing Device, William M. Melling, Chicago, Ill.; assignor of 45-100 to Anthony Doerfler, same city; No. 1,087,803. Filed April 24, 1913.

Door for Automobiles, William G. Miner, Chatham, Va.; No. 1,087,809. Filed Dec. 4, 1911.

Motor, Joseph Leon Thivolle, Dijon, France, assignor

to Constructions Industrielles Dijonnaises, same city; No. 1,087,470. Filed Aug. 13, 1912; original application July 26, 1911.

Internal Combustion Engine, Thomas P. Sitzler, Camden, N. J.; No. 1,087,841. Filed Feb. 21, 1912.

Spark Plug, Charles E. Talbert, Washington, D. C., assignor to Edwin C. Henn, Cleveland, O.; No. 1,087,897. Filed March 18, 1912.

Shock Absorber, Marshal D. Tillman, Wabash, Ind.: No. 1,087,898. Filed Aug. 30, 1911.

Radiator, Gardner E. Wheeler, New Haven, Conn., assignor to English & Mersick Company, same city; No. 1,087,899. Filed July 8, 1912.

Radiator, William Cleveland and Jacob R. Ockinga, Glenville, Neb.; No. 1,087,992. Filed Feb. 24, 1913.

COMING EVENTS.

March.

March 17—S. A. E. springs division meeting, New York City.

March 17-21—Truck show, Mechanics' building, Boston, Mass.

March 18-22—Show, Sharon, Penn.

March 21-28—Show, St. John, N. B.

March 24—S. A. E. brochies division meeting, New York City.

March 31—S. A. E. electric vehicle division meeting, New York City.

April.

April 7-9—S. A. E. standards committee meeting, New York City.

April 9-15—Show, Manchester, N. H.

April 12—Show, Palermo, Italy.

April 12-19—Show, Vienna, Austria.

April 21—S. A. E. research division meeting, New York City.

April 22—Track races, Bakersfield, Cal.

May.

May 5—S. A. E. electrical equipment division meeting, New York City.

May 12—S. A. E. ball bearing division meeting, New York City.

May 14—S. A. E. motor testing division meeting, New York City.

May 24-25—Targa Florio race, Italy.

May 30—500-mile race, Indianapolis, Ind.

May 30—Track meet, New York City.

May 30—Track races, Providence, R. I.

June.

June 1—Coupe Florio race, Palermo, Italy.

June 6-7—Track meet, St. Louis, Mo.

June 9-11—Isle of Man road race.

June 17-18—Hill climb, Unlontown, Penn.

June 23-26—S. A. E. midsummer meeting, Cape May, N. J.

June 30—Track races, Sioux City, Ia.

July.

July 3-4—Road races, Tacoma, Wash.

July 4—Track races, Providence, R. I.

July 4—300-mile race, Sioux City, Ia.

July 4—Grand Prix, Lyons, France.

July 17-18—Speedway meet, Seattle, Wash.

July 25-26—Grand Prix, Belgium.

August.

Aug. 28-29—Road races, Elgin, Ill.

September.

Sept. 5—Track races, Milwaukee, Wis.

Sept. 7—Track races, Providence, R. I.

Sept. 9—Speedway races, Pomona, Cal.

Sept. 9—Road races, Corona, Cal.

Sept. 9—Grand Prix, Italy.

Sept. 26-Oct. 6—Show, Berlin, Germany.

October.

Oct. 2-3—Track meet, Oklahoma City, Okla.

Oct. 2-3—Track meet, Trenton, N. J.

Oct. 16-26—Automobile Salon, Paris.

Oct. 19-26—American road congress, Atlanta, Ga.

November.

Nov. 6-16—Olympia show, London.

Nov. 8-11—Track meet, Shreveport, La.

NO BREAK IN PRODUCTION.**Paige-Detroit Motor Car Company Removes to New Plant Without Interruption.**

As stated in these columns recently, the new factory of the Paige-Detroit Motor Car Company, Detroit, maker of Paige cars, has been completed. The concern is now established in its new home, and the methods employed in making the removal were such that there was no interruption of production.

The moving of a factory of any size or kind usually entails the loss of time in actual moving, in starting production in the new plant, and in waiting for stock. In this instance, a whole month was given over to preparation, as a result of which each department was moved separately on a given date and in a manner that would have no effect upon the remainder of the plant.

The motor assembly department, for instance, was given a certain moving date, and on that date was sufficiently ahead of the production in other departments to give it ample time to be running smoothly in the new factory before the rest of the production caught up to it. All new stock for this department was ready; new machines set up, and every detail worked out to lessen the time needed for the change. The same method was applied to each department.

NET PROFITS OF \$7,140,125.**United States Rubber Company Reports Substantial Increase in Tire Sales.**

In view of the change of date for the ending of the fiscal year, from March 31 to Dec. 31, the annual report of the United States Rubber Company, New York City, just made public, covers only nine months. However, the statement shows net sales of \$87,349,692, and net profits of \$7,140,125. This covers the products of various subsidiary companies, engaged in the manufacture of footwear, tires, mechanical and miscellaneous goods.

Included in the surplus of \$1,811,268, are the earnings of certain subsidiaries for the three months ending March 31, 1913, estimated at \$764,657. Deducting this and \$10,939 applicable to minority interests, there remains a balance of \$1,035,672. After adding 4.5 per cent. paid on the common stock, amounting to \$1,620,000, the total, \$2,655,672, represents the amount available for common dividends for the nine months, equal to 7.37 per cent. on \$36,000,000 common outstand-

ing, or at the rate of 9.83 a year. The volume of business done during the nine months was somewhat larger than for the corresponding period in 1912, and the company reports a substantial gain in tire sales through the United States Tire Company.

MRS. HACKETT LEFT PENNILESS.**Well Known Tire Sales Manager's Widow and Child in Extreme Need.**

Circumstances resultant from the death of William J. B. Hackett, sales manager of the Cataract Tire & Rubber Company, who died Dec. 19 at his home in Boston, Mass., are such that The Automobile Journal is impelled to make them known, because there is no doubt that those who knew and appreciated Mr. Hackett in life will be disposed to manifest their friendship in a manner that will benefit his widow and a three-year-old daughter.

Mr. Hackett was an extremely likeable man, enterprising and industrious, and was but 28 years of age when he succumbed to an illness that had continued eight months. His sickness exhausted his resources and when he died Mrs. Hackett and baby were left without even sufficient funds to defray the burial expense. Mrs. Hackett has no people to whom she can turn for assistance, and she is penniless and in great need of substantial aid.

Mr. Hackett was widely and favorably known and there are undoubtedly those who will consider the circumstances in which his widow and child have been placed a reason for contributing liberally to her relief. Those who wish to assist her can send contributions to Paul M. Foss, attorney-at-law, 31 State street, Boston, Mass., or to Mrs. Gertrude C. Hackett, 19 Norway street, Boston.



The Late William J. B. Hackett.

SCOTTISH ASSOCIATION FORMED.

T. C. Pullinger Elected Chairman of Body, Which Has 70 Charter Members.



T. C. Pullinger, Chairman,
Scottish Section, I. A. E.

Members of the Society of Automobile Engineers and others in the industry who met the members of the Institution of Automobile Engineers of Great Britain upon the occasion of their official visit to America in 1913, will be interested to learn that T. C. Pullinger has been elected chairman of the Scottish section of that institution, recently formed in Glasgow. The meeting was held at the Windsor hotel, Feb. 20, and among those in attendance were J. S. Critchley, president of the main body, and F. J. Smith, secretary of the Scottish Automobile Club. The new association starts with a charter membership of 70.

G. E. McCaw was elected honorary secretary, and the following were chosen to act as a provisional committee, with authority to draw up the rules for submission to the council of the parent body: J. F. Henderson, Laurence Bell, G. H. Cutbush, G. Dearie Russel, H. Perrot, J. Carlaw, W. L. Spence and W. J. Thomson. A lecture committee, consisting of J. Iglis Ker, R. J. Smith, Wallace Fairweather and A. F. Sinclair, also was appointed.

NO CADILLAC SIX.

President Henry M. Leland Sees Fit to Correct an Erroneous Impression.

The Cadillac Motor Car Company, Detroit, has no intention of producing a six-cylinder car, according to President Henry M. Leland, who is also president of the Society of Automobile Engineers. The announcement is made to correct an erroneous impression, which Mr. Leland felt had been created. Part of this statement follows:

We have experimented, it is true, with engines of six cylinders; in fact, we have built a number of such cars in the past four years. We have tested them to the utmost, and we have compared them, point by point, with some of the most highly regarded sixes which we had bought for just this purpose. It may be interesting to note, in this connection, that we did not find a single six,

which, in our opinion, outpointed our own in these exhaustive tests. These experiments may have been the basis of rumors that we were to market a six-cylinder Cadillac—but this company has no such intention.

LEAVES HAYNES COMPANY.

George H. Strout Will Retire as General Sales Manager on April 1.

General Manager A. G. Seiberling of the Haynes Automobile Company, Kokomo, Ind., makes public the resignation of George H. Strout, who resigned as district sales manager of the Cole Motor Car Company, Indianapolis, Ind., about a year ago to become general sales manager of the Haynes. It is understood that Mr. Strout will leave April 1, and, although he has not announced his plans for the future, it is expected that he will soon become identified with one of the well known motor car makers.

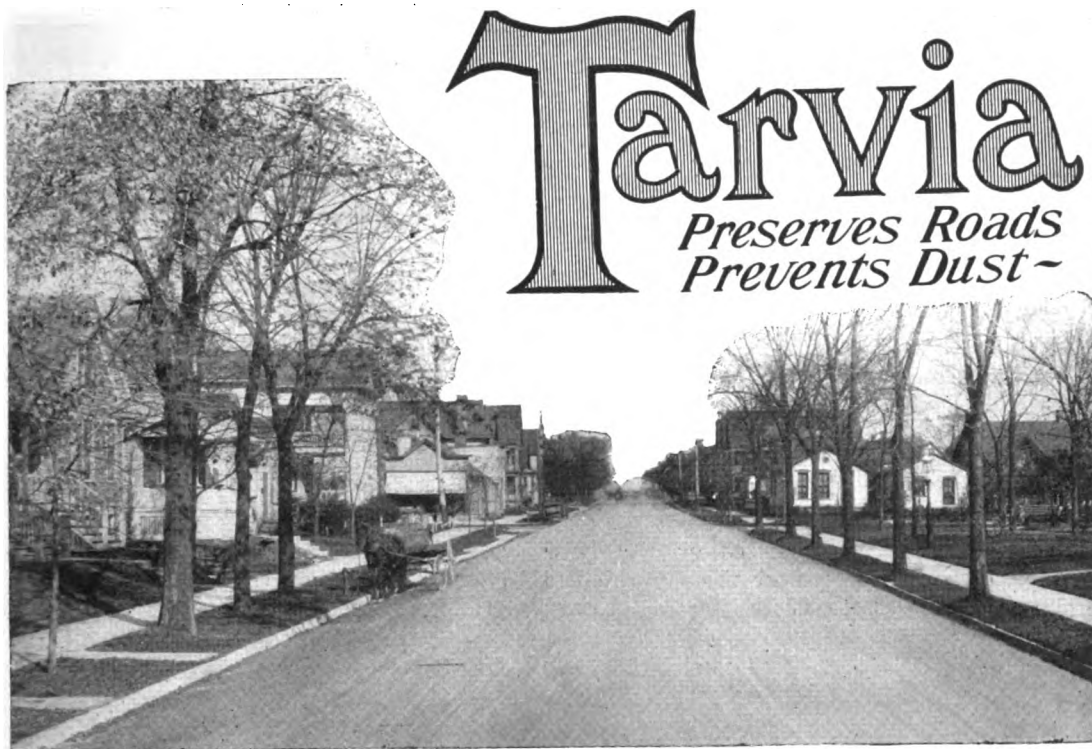
Mr. Strout is undoubtedly one of the most widely known sales executives in the industry. Shortly after graduating from college, he became identified with the bicycle industry, and since 1899 has been interested in the sale of automobiles. Among the more important positions he has filled with unusual success are the following: President, Western Automobile Company, St. Paul, Minn.; sales manager, Electric Vehicle Company, Hartford, Conn.; sales manager, Apperson Bros. Automobile Company, Kokomo, Ind., and the two already mentioned above.

In making public the resignation from the Haynes company, Mr. Seiberling states that the work for which Mr. Strout was engaged has been accomplished, and

that as a result of his efforts the company has been placed in a much stronger position throughout the country than ever before in the 21 years of its existence.



George H. Strout, Well Known
Sales Executive.



Fifth Avenue, looking north from Washington St., Milwaukee, Wis. Treated with "Tarvia B".

Milwaukee's Experience with Tarvia

Milwaukee has found that ordinary macadam is unsatisfactory under automobile traffic but that its resistance to wear can be much improved by the use of "Tarvia B". This material has been used on plain macadam and on streets which were built with tar binder and needed touching up.

The Superintendent of Street Cleaning, Mr. Charles O. Davis, writes:

I am pleased to say that the results obtained from the use of this Tarvia are very satisfactory.

We have applied this material on tar penetration streets which had begun to ravel, and find that with a very good covering of this material the ravelling was stopped. It gave to the road a nice smooth surface.

Our experience also on waterbound macadam streets is satisfactory and the streets show up fine. One application

sets up the surface, keeping out all water, with the result that the road is kept in good condition. It eliminates the dust nuisance as well.

"Tarvia B" is a special preparation of coal tar, which may be applied to the road either by hand or from some form of modern power sprinkler. The Tarvia percolates into the surface and hardens, forming a tough surface binder. The treated surface sheds water, resists ravelling and automobile traffic, and prevents the formation of dust. As a method of maintenance, periodical treatment with "Tarvia B" is inexpensive and highly satisfactory.

A more thorough method of preserving roads is to build them with Tarvia throughout, in which case the denser grades of Tarvia are used.

Booklet on request. Address our nearest office.

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Cincinnati Minneapolis Pittsburgh Seattle Birmingham
THE PATERSON MFG. CO., Ltd.:—Montreal Toronto Winnipeg Vancouver St. John, N. B. Halifax, N. S. Sydney N. S.



When Writing to Advertisers, Please Mention The Automobile Journal.

TO LIST MORE STOCKS.

Application Made to New York Stock Exchange by General Motors Company.

The General Motors Company, Detroit, has applied to the listing committee of the New York Stock Exchange for the listing of additional voting trust certificates representing \$714,000 par value of common stock, issued since the last application in 1911, and \$583,000 preferred stock, issued since that application. In addition, the company applies for permission to list from time to time \$3,374,200 of common stock and \$3,036,900 of preferred stock, both of which are held at present in the treasury, on notice from the company that the stock has been disposed of. The total amount of stock comprised in this application is \$4,088,200 common and \$3,619,900 preferred.

In this connection, it may be noted that the General Motors stock now listed on the New York Stock Exchange has more than doubled in value since the first of the year. At the close of 1913 the common was quoted around 36, while during the week of March 2 the quotation was

78. The preferred was selling during the last week in December for 78, and during the first week in March at 94.

MANY MEMBERS IN FEBRUARY.

Federation of American Motorcyclists Receives 248 Additions During the Month.

The membership statistics for the month of February, as reported by G. B. Gibson, Westboro, Mass., secretary-treasurer, show that the Federation of American Motorcyclists now comprises a total of 25,917 riders. Two hundred and forty-eight names were added during the month, divided according to states as set forth in the following:

Illinois, 40; New York, 27; Ohio, 24; Texas, 24; New Hampshire, 21; Missouri, 15; California, 14; Pennsylvania, 13; Kansas, 10; Iowa, seven; Maryland, six; Wisconsin, six; Indiana, five; Georgia, four; Massachusetts, four; Oregon, three; Tennessee, three; Arizona, Colorado, Michigan, Minnesota and Montana, two each; Connecticut, North Carolina, North Dakota, South Dakota and Virginia, one each.



GEARLESS TRANSMISSION

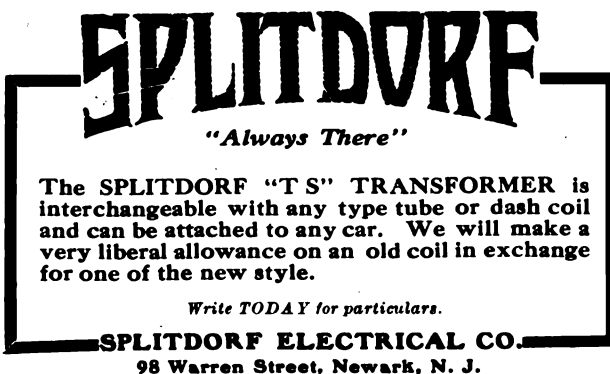
SMOOTH—QUIET—POWERFUL

Model 7, \$1250

Other Models \$1600, \$1700, \$1900, \$2000

Write for full particulars and catalogue

Cartercar Company Pontiac Michigan



"Always There"

The SPLITDORF "T S" TRANSFORMER is interchangeable with any type tube or dash coil and can be attached to any car. We will make a very liberal allowance on an old coil in exchange for one of the new style.

Write TODAY for particulars.

SPLITDORF ELECTRICAL CO.

98 Warren Street, Newark, N. J.



NEW DOVER GARAGE SOAP ECONOMIZER

Reduces Soap Consumption Over One-Half

Saves all Waste

Prevents Theft

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(2) Dover Stamping & Mfg. Co., Cambridge, Mass.

Why should the auto business be different from any other business? To my mind it is not, and the sooner it gets down to a horse sense basis the healthier it will be. The day when it was a "game" is gone. The red fire and hurrah period is past. And the companies which stay in are the ones which are going to adopt a hard-headed, close-margined, business-like policy.

E. W. Howard

President of The Lexington-Howard Co.
Manufacturers of Lexington "Four," \$1888, and the Howard "Six," \$2276,
131 Main St., Connersville, Indiana, U. S. A.

"THE TUGBOAT OF LAND COMMERCE"

SOLVES THE
HEAVY TRUCKING
PROBLEM



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MARTIN
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KNOX AUTO CO., SPRINGFIELD
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The Boston Tail Light Detector

Does what its name indicates--tells you when your rear light fails to work and saves court fines.

Easy to Attach. Price \$5.00, in all finishes. Agents wanted everywhere.

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METZ "Twenty-Two" \$475

Stylish Roadster, completely equipped, fully guaranteed. 4-cylinder, 22 1/2 H. P. water-cooled motor, Bosch magneto, artillery wheels, best quality clincher tires. Makes 5 to 50 miles per hour. 28 to 32 miles on 1 gal. of gasoline. Great hill climber. You can secure EXCLUSIVE SALE in your territory. Write for Book "Q".
METZ COMPANY, Waltham, Mass., U. S. A.

DECARBONIZER

Chemically removes carbon from cylinders, pistons, rings and valves

INCREASES POWER 20 PER CENT.

Verminous carbon, in which form it passes out thru exhaust; injury to metal impossible. Agents wanted in certain localities. Sample quart can \$1.50. Write today for particulars.

MILWAUKEE AUTO SPECIALTY COMPANY
128 Second St., Milwaukee, Wis.

**J.M. Shock Absorber**

Its efficiency is proved by scientific facts—not mere claims. Write for Ovington Data D. to **The J. M. Shock Absorber Co.,** 210 S. 17th Street, Philadelphia. Branches in Boston, Hartford, Providence, and all leading cities



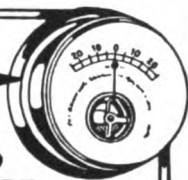
ALWAYS SPECIFY

HOYT METERS

AND GET YOUR MONEY'S WORTH

HOYT ELECTRICAL WORKS

INSTRUMENT
PENACOOK, NEW HAMPSHIRE



FORD OWNERS
Rusco Transmission
Brake Lining
SOLVES THE PROBLEM



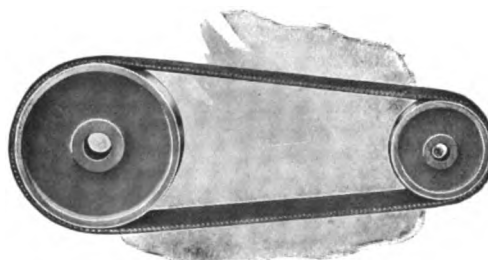
The **RUSCO** Ford Brake Lining is Made Wholly of Long Fibre Asbestos. There is No Wire in it and it is Guaranteed Not to Short Circuit the Magneto.

The **RUSCO**, Which is Made Especially for Ford Cars, is Water, Oil and Friction Heat Proof. Stops the Car Easily and Quietly and Does Not Strain the Working Parts.

Made in All Sizes and Widths up to and including 9" Wide by 1/2" Thick.

RUSCO Ford Brake Lining Comes Packed in a Special Box Sufficient to Equip the Car, as Well as Copper Rivets for Application. Price, \$1.00.

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RUSCO FAN BELT

Is the One Practical Fan Belt for Ford Cars, Because it is Woven Endless. Made Uniform Throughout and Guaranteed to Give Perfect Service and Wear. It Will Do Away With All Fan Belt Bother. Price, 30 Cents Each.

Dealers: Write for Samples, Prices and Trade Discounts.

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THE JOHN V. WILSON CO.
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Weed Anti-Skid Chains

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Weed Chain Tire Grip Co., New York

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ALDING PORCELAIN PLUGS



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75c Value

50c
EACH

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LUBRICANTS

HARRIS

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All the Facts on all Lighting Systems mailed you on request.
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MAKE IGNITION CERTAIN!

Develop More Power on Less Fuel

A type for every engine. BOOKLET FREE.

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For the Automobile Owner and Manufacturer
who wants SERVICE for his money

ELECTRIC LIGHTING SPECIALTIES Made to Order

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GEISZLER NON-SULPHATING STORAGE BATTERIES

Guaranteed perfect satisfaction or money refunded

SIZE 66 - \$20.00

GEISZLER BROS. STORAGE BATTERY COMPANY
514 West 57th Street, New York City

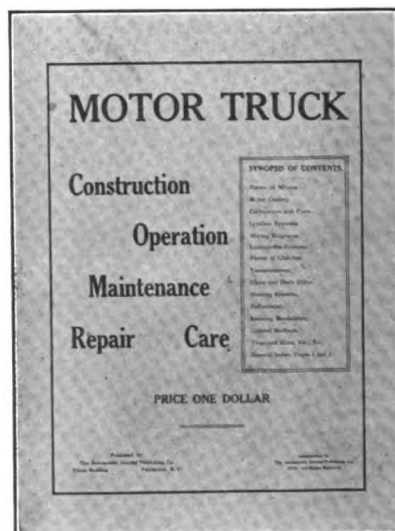
ANNULAR BEARINGS REGROUND



A complete stock of reground bearings of all sizes and makes on hand for immediate exchange. Also a complete stock of New Annular, Thrust and New Departure Double Row Bearings. Special bearings made on application.
1790 Broadway, New York, N. Y.

AHLBERG BEARING CO. CHICAGO DETROIT BOSTON

A B C OF Motor Truck Operation



PRICE \$1.00 Postpaid

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Auto Parts Co., Providence, R. I.

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

Miller, Chas. E., 97-103 Reade St., New York.

Branches: 202-204 Columbus Ave., Boston; Bridge and Dwight streets, Springfield, Mass.; 274 Trumbull St., Hartford, Conn.; 924 Eighth Ave. and 2782 Broadway, New York; 1421 Bedford Ave., Brooklyn, N. Y.; 313 No. Broad St., Philadelphia; 824 Main St., Buffalo, N. Y.; 1829 Euclid Ave., Cleveland; 227 Jefferson St., Detroit; 259 Peachtree St., Atlanta, Ga.; 601-603 Baronne St., New Orleans, La.; 135 Central Ave., Albany, N. Y.; 274 Halsey St., Newark, N. J.

Milwaukee Auto Specialty Co., 128 Second St., Milwaukee, Wis.

Motor Parts Co., 185-187 Columbus Ave., Boston; 818 No. Broad St., Philadelphia; Springfield, Mass.

Northwestern Chemical Co., Marietta, O.

Walte Auto Supply Co., 81 Exchange place, Providence.

ACETYLENE TANKS. (See Tanks.)

AIR COMPRESSORS AND TANKS.

Williams Foundry & Machine Co., Akron, O.

AMMETERS AND VOLTMETERS.

Hoyt Electrical Instrument Works, Penacook, N. H.

AUTOMOBILES. (See Cars.)

AUTOMOBILE SPECIALTIES.

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y. (Brass Goods.)

BALLS AND BALL BEARINGS.

Ahlberg Bearing Co., 2624 Michigan Ave., Chicago; 1786 Broadway, New York City; 805 Woodward ave., Detroit.

Boyd, F. Shirley, 903 Boylston St., Boston. (R. I. V.)

Hyatt Roller Bearing Co., Detroit.

Marburg Bros., Inc., 1790 Broadway, New York. (S. R. O.)

New Departure Mfg. Co., Bristol, Conn.

R. I. V. Co., 1771 Broadway, New York. (R. I. V.)

BATTERIES.

Electric Storage Battery Co., Philadelphia. (Exide.)

Geissler Bros. Storage Battery Co., 514 W. 57th St., New York.

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City. (J-M.)

Walte Auto Supply Co., 81 Exchange place, Providence. (Success.)

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Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

(Continued on Next Page.)

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AMERICA'S
GREATEST TOURING CAR

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CAMERON CARS

Mechanically Excellent

A remarkable lot of car value is contained in the 1914 CAMERON. Patented Four-Speed Transmission, Water Cooled, Electric Lighting and Starting. Price, \$1200.

See it. Examine it. Ride in it. You'll be convinced.

Get our literature—NOW.


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The performance of Eisemann Ignition Systems during the Indianapolis Pacific Tour justifies every claim we have ever made for Eisemann efficiency and dependability.

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Sole Importers
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	OLYMPIC - \$1500
	4 cylinders
	MAJESTIC - \$1975
	4 cylinders
SULTANIC - \$2500	6 cylinders

No Hill Too Steep
No Sand Too Deep

JACKSON AUTOMOBILE CO., 1203 East Main St. Jackson, Mich.

National

STOCK CHAMPION

FOUR AND SIX CYLINDER CARS

Electric Starter Electric Lights

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AKRON, OHIO

This name on Automobile Tires and Rubber Accessories signifies inherent qualities of material and workmanship that insure the maximum of service at the minimum of expense.

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CATARACT TIRE SERVICE

THE 10% OVERWEIGHT TIRES

Guaranteed for 4000 Miles Service

Measured by Mileage, the Cheapest Shoes Ever Made. Clincher and Quick Detachable, Plain and Break-Skid Treads, Regular and Metric Sizes, for All Standard Rims.

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Boston, New York, Providence. Factory: WOOSTER, O.

VALVOLINE OIL CO.

Heavy, Medium and Light

Automobile Oils

27 STATE STREET BOSTON, MASS.



Bay State Autokit, No. 1, \$10

Bay State Autokit, No. 2, \$7.50

Bay State Stickit, \$3

GEO. A. CUTTER, Sales Agent

Taunton, Mass.

HOW LARGEST PROFITS ARE MADE

We have some interesting facts in connection with increasing your car sales and profits.

Through merchandising strategy we have remedied these flaws. May we tell you about these things and about our kerosene-burning car, equipped with wire wheels, cowl dash, cowl fuel tank? Left drive, center seat control, the most salable car offered today. Write or wire for the facts.

HENDERSON MOTOR CAR CO., INDIANAPOLIS, IND. 50

(BUYERS' GUIDE—Continued.)

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Springfield Metal Body Co., 20 Medford Ave., Springfield, Mass.

BRAKE BANDING OR LINING.

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City. (J-M Non-Burn.)

Russell Mfg. Co., Middletown, Conn. (Rusco.)

Standard Woven Fabric Co., Framingham, Mass. (Multibestos.)

Branches: F. Shirley Boyd, 903 Boylston St., Boston; C. D. Schmidt, 276 Canal St., New York City; N. A. Petry Co., 1427 Vine St., Philadelphia; F. E. Sparks, 1430 Michigan Blvd., Chicago; Fred Ward & Son, San Francisco.

BRUSHES, WIRE.

Williams Foundry & Machine Co., Akron, O.

BUMPERS AND FENDERS.

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.

Sager Co., J. H., 271 South Ave., Rochester, N. Y. (Diamond.)

CARBON REMOVERS. (See Cylinder Cleaning Compound.)

CARS—ELECTRIC PLEASURE.

Baker Motor Vehicle Co., Cleveland. (Baker.)

CARS—GASOLINE PLEASURE.

American Volturette Co., Detroit. (Keeton.)

Austin Automobile Co., Grand Rapids, Mich. (Austin.)

Cartercar Co., Pontiac, Mich. (Cartercar.)

Cole Motor Car Co., Indianapolis, Ind. (Cole.)

Empire Automobile Co., Indianapolis, Ind. (Empire, Little Aristocrat.)

Haynes Automobile Co., 166 Main St., Kokomo, Ind. (Haynes.)

Henderson Motor Car Co., Indianapolis, Ind. (Henderson.)

Jackson Automobile Co., 1400 Main St., Jackson, Mich. (Jackson.)

Knox Automobile Co., Springfield, Mass. (Knox.)

Lexington-Howard Co., Connersville, Ind. (Lexington and Howard.)

Maxwell Motor Co., Inc., Detroit. (Maxwell.)

Metz Company, Waltham, Mass. (Metz.)

Moline Automobile Co., E. Moline, Ill. (Moline.)

National Motor Vehicle Co., 1033 22nd St., Indianapolis. (National.)

Nordyke & Marmon Co., Indianapolis. (Marmon.)

Owen & Co., R. M., 19 W. 62nd St., New York City. (Reo.)

Paige-Detroit Motor Car Co., Detroit. (Paige.)

Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)

Premier Motor Mfg. Co., Indianapolis, Ind. (Premier.)

Reo Motor Car Co., Lansing, Mich. (Reo.)

Studebaker Corp., Detroit. (Studebaker.)

Stutz Motor Car Co., Indianapolis. (Stutz.)

Velle Motor Vehicle Co., Moline, Ill. (Velle.)

(Continued on Next Page.)

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(BUYERS' GUIDE—Continued.)

White Co., The, 828 E. 79th St., Cleveland. (White.)

Branches: 320 Newbury St., Boston; Broadway and 62nd St., New York; 629-633 No. Broad St., Philadelphia; 138-148 Beatty St., Pittsburgh, Penn.; 610 S. Michigan Ave., Chicago; Market St. and Van Ness Ave., San Francisco; 120-122 Marietta St., Atlanta, Ga.; 74 Victoria St., Toronto, Can.

Willys-Overland Co., Toledo, O. (Overland.)

CARS—STEAM PLEASURE.

White Co., The, 828 E. 79th St., Cleveland. (White.)

Branches: See Cars—Gasoline Pleasure.

CARS—GASOLINE COMMERCIAL.

Adams Bros. Co., Findlay, O. (Adams.)

Bessemer Motor Truck Co., Grove City, Penn. (Bessemer.)

Blair Mfg. Co., Newark, O. (Blair.)

Cartercar Co., Pontiac, Mich. (Cartercar.)

Commerce Motor Co., Detroit. (Commerce.)

Dart Manufacturing Co., Waterloo, Ia. (Dart.)

Driggs-Seabury Ordnance Corp., Sharon, Penn. (Vulcan.)

Federal Motor Truck Co., Junction and Leavitt Sts., Detroit. (Federal.)

Garford Co., Elyria, O. (Garford.)

General Motors Truck Co., 26 Cadillac Ave., Pontiac, Mich. (GMC.)

Branches: New York, Chicago, Boston, Philadelphia, Kansas City.

Gramm-Bernstein Co., Lima, O. (B. A. Gramm's.)

Knox Automobile Co., Springfield, Mass. (Knox and Martin Tractor.)

Owen & Co., R. M., 19 W. 62nd St., New York City. (Reo.)

Palmer-Moore Co., Syracuse, N. Y. (Palmer-Moore.)

Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)

Reo Motor Car Co., Lansing, Mich. (Reo.)

Studebaker Corp., Detroit. (Studebaker.)

Tarrytown Motor Car Co., Inc., 1790 Broadway, New York City. (MotoKart.)

Velle Motor Vehicle Co., Moline, Ill. (Vellie.)

Willys-Overland Co., Toledo, O. (Overland.)

CARS—ELECTRIC COMMERCIAL.

Baker Motor Vehicle Co., Cleveland. (Baker.)

Couple-Gear Freight-Wheel Co., 575 Buchanan St., Grand Rapids, Mich. (Couple-Gear.)

Branches: 30th floor, Singer Bldg., New York; 178 Devonshire St., Boston.

General Motors Truck Co., 26 Cadillac Ave., Pontiac, Mich. (GMC.)

Branches: See Cars—Gasoline Commercial.

General Vehicle Co., Long Island City, N. Y. (G. V.)

CARS—FIRE, POLICE AND MUNICIPAL SERVICE.

Cartercar Co., Pontiac, Mich. (Cartercar.)

Couple-Gear Freight-Wheel Co., 575 Buchanan St., Grand Rapids, Mich. (Couple-Gear.)

Branches: See Cars—Electric Commercial.

Knox Automobile Co., Springfield, Mass. (Knox and Martin Tractor.)

White Co., The, 828 E. 79th St., Cleveland. (White.)

Branches: See Cars—Gasoline Pleasure.

Willys-Overland Co., Toledo, O. (Overland.)

(Continued on Next Page.)

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You can't short circuit J-M^(MEZGER) SOOT-PROOF SPARK PLUGS Prove it with this test



These plugs are absolutely soot-proof. Prove it yourself by holding one in the flame of a candle or lamp until the end is covered with soot. THEN place it in your engine, turn on the power, and it will positively clean itself. The secret is in the porcelain insulator, or "petticoat," which extends to the end of the plug.

This porcelain becomes so hot at the tip that carbon is burned up the instant it settles. No soot—hence no short-circuit.

Over 400,000 high-class cars are now equipped with the J-M (Mezger) Soot-Proof Spark Plug.

GUARANTEE: The J-M (Mezger) Soot-Proof Plug is backed by a five-million dollar concern with a fifty-five year record for square dealing. If any plug does not give satisfactory service, we will exchange it for a new one. Price, \$1.

Write nearest Branch for interesting Booklet.

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More Silence

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Four-cylinder,
five-passenger,
50 horsepower,
128-in. wheelbase.

Bosch ignition,
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ing, \$2400.

The car of the future will not have poppet valves
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THE HEINZE ELECTRIC COMPANY

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BLUE STONE AND STEEL HERZ & CO.
NEW YORK

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NOW

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*The Completely Equipped Empire
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We will send the pictured
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Empire on request.*

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Electric Lighting and Starting Systems
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Electric House Lighting Outfits Golden Glow Headlights
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Are of the highest quality and the cheapest on mileage. They are built to last. Send for price list and particulars.

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Northwestern Chemical Co., Marietta, O. (Se-ment-ol Ra-diator.)

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Weed Chain Tire Grip Co., 28 Moore St., New York.

CHAINS—TRANSMISSION OR DRIVING.

Boyd, F. Shirley, 903 Boylston St., Boston. (Baldwin.)

Miller, Chas. E., 97-103 Reade St., New York. (Brampton.)

Branches: See Accessory Manufacturers and Jobbers.

COILS.

Heinze Electric Co., Lowell, Mass.

CYLINDER CLEANING COMPOUND.

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.

Milwaukee Auto Specialty Co., 128 Second St., Milwaukee.

Northwestern Chemical Co., Marietta, O. (Carbonox.)

Prest-O-Lite Company, 226 Speedway, Indianapolis. (Prest-O-Carbon Remover.)

Branches: Atlanta, Baltimore, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Indianapolis, Jacksonville, Kansas City, Los Angeles, Milwaukee, Minneapolis, New York, Omaha, Philadelphia, Pittsburg, Providence, San Francisco, Seattle, St. Louis and St. Paul.

ELECTRIC LIGHTING EQUIPMENT.

Culver-Stearns Mfg. Co., Worcester, Mass.; Detroit.

FIRE EXTINGUISHERS.

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

Northwestern Chemical Co., Marietta, O. (Fire-Fly.)

Pyrene Co. of New England, 176 Federal St., Boston.

FORD AUTOMOBILE EQUIPMENT.

Russell Mfg. Co., Middletown, Conn.

FUNNELS.

Dover Stamping & Manufacturing Co., Cambridge, Mass. (Dover.)

GASKETS AND GASKET CUTTERS.

Shawver Co., Springfield, O.

GEARS, STEERING.

Ross Gear & Tool Co., 794 Heath St., Lafayette, Ind.

GUNS, GREASE. (See Pumps, Oil and Grease.)

HORNS.

Dean Electric Co., Elyria, O. (Tuto.)

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

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Kent Mfg. Works, Atwater, 4937 Stenton Ave., Wayne Junction, Philadelphia. (Monoplex.)

IGNITION EQUIPMENT.

Kent Mfg. Works, Atwater, 4937 Stenton Ave., Wayne Junction, Philadelphia.

INSULATION.

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

JACKS, ETC.

Shawver Co., Springfield, O.

LAMPS, TAIL. (See Tail Lights.)

LIGHTING SYSTEMS, ELECTRIC.

Apple Electric Co., Dayton, O. (Apelco.)

Dean Electric Co., Elyria, O. (Dynalux.)

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

LUBRICANTS.

Alsten & Goulding Co., 36 Foster St., Worcester, Mass. (Alding.)

Borne, Serymsier Co., 80 South St., New York. (Colonial.)

Branches: Boston, Fall River, Philadelphia.

Dixon Crucible Co., Jos., Jersey City, N. J. (Graphite.)

Eagle Oil & Supply Co., 104 Broad St., Boston. (Eagle-line No-Karbon.)

Harris Oil Co., A. W., 326 South Water St., Providence. (Harris.)

Branch: 143 No. Wabash Ave., Chicago.

Haws, Geo. A., 148 Front St., New York. (Panhard.)

Branch: 899 Boylston St., Boston.

Invader Oil Co., 80 Broad St., New York. (Invader.)

Branches: 284 Columbus Ave., Boston; 113 Arch St., Philadelphia; 512 Kenols Bldg., 11th and G Sts., N. W., Washington, D. C.

Miller, Chas. E., 97-103 Reade St., New York. (Pan-American.)

Branches: See Accessory Manufacturers.

New York & New Jersey Lubricant Co., 165 Broadway, New York. (MoToRol, Non-Fluid, Kejex.)

Northwestern Chemical Co., Marietta, O. (Gear-Silence.)

Platt & Washburn Refining Co., 7 Broadway, New York City. (Veedol.)

Standard Oil Co., New York. (Polarine.)

Branches: In all cities.

Texas Company, The, 7 West St., New York.

Branches: Boston, Philadelphia, Chicago, St. Louis, Norfolk, Atlanta, New Orleans, Dallas, El Paso, Pueblo, Tulsa, Houston.

Vacuum Oil Co., Rochester, N. Y. (Mobiloil.)

Branches: 49 Federal St., Boston; 29 Broadway, New York; Fourth and Chestnut Sts., Philadelphia; 154 Exchange St., Bangor, Me.; 406 Hitchcock Bldg., Springfield, Mass.; 117 Commercial St., Portland, Me.; Fisher Bldg., Chicago; Ford Bldg., Detroit; Indiana Pythian Bldg., Indianapolis.

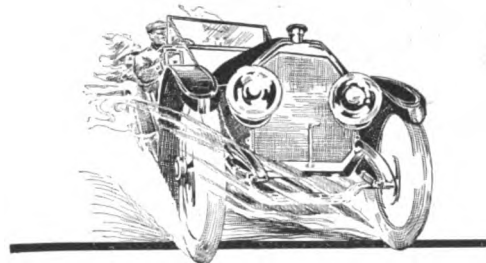
Valvoline Oil Co., 27 State St., Boston. (Valvoline.)

MAGNETOS AND SUPPLIES.

Bosch Magneto Co., 223-225 W. 46th St., New York.

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A Barrel of Polarine

Will end your lubricating problem for a long while.

Polarine

Reduces friction to a minimum. Holds its body under any heat or pressure. Leaves practically no carbon. Flows freely down to zero.

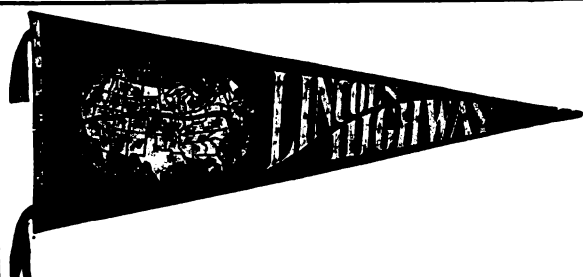
Polarine comes in half-barrels, barrels, gallon and five gallon lithographed cans.

Use Socony Motor Gasoline



For Sale by All Dealers or

**STANDARD
OIL COMPANY**
OF NEW YORK



**"Of the people, by the people,
for the people."**

Lincoln's own words fitly describe the purpose back of the Lincoln Highway. If Lincoln were here and could select his own memorial it would be something useful like this road—something of, and by, and for the people.

Every man cannot be a Lincoln. It is given to all, however, to act in the spirit of Lincoln. The spirit of sacrifice, of devotion to the public good, of pure patriotism.

You would resent the suggestion that you are not patriotic. But what have you done recently to prove it?

Five dollars is a small amount of money. But you can prove yourself a patriot by sending that amount to the Lincoln Highway Association.

There are ten million men in this country who could send this sum and never miss it. And as many more who could send it without hurting. If half this number WOULD send \$5 the success of the Lincoln Highway would be ABSOLUTELY ASSURED.

This Highway will be a magnificent monument to Abraham Lincoln—but as age succeeds age it will be still more a magnificent monument to the common sense, the far-seeing wisdom and the patriotism of the generation—our generation—that built it.

Send \$5 or more today and become a Lincoln Highway builder. Send the Money TODAY while you are in the mood.

If you don't take part in this great work you will have a sneaking feeling of shame all your life whenever the Lincoln Highway is mentioned. Send the \$5 and you will always have a glow of pride in the thought that you helped to adorn your country with this great road stretching like a silver ribbon from blue ocean to blue ocean, binding together states and cities and rural communities in bonds more firm than those of law and language.

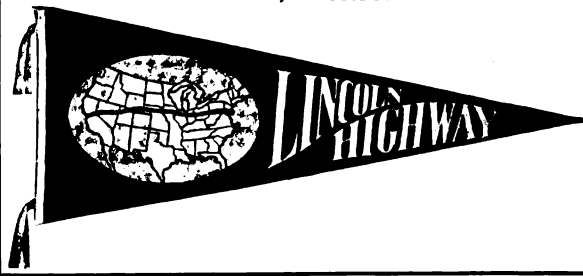
Mail \$5 or more today to A. R. Pardington, 2115 Dime Bank Building, Detroit.

Pennant illustrated herewith is in four colors at \$1 per pair. (Rights and Lefts.) Decorate your car. Be a BOOSTER.

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Copy contributed by Ford, President Saxon Motor Car Co.

The Lincoln Highway Association
DETROIT, MICHIGAN



Branches: 119-121 E. 24th St., Chicago; 1250 Woodward Ave., Detroit; 357 Van Ness Ave., San Francisco.

Eisemann Magneto Co., 225-227 W. 57th St., New York City. (Eisemann.)

Branches: 514 No. Capitol Ave., Indianapolis; 802 Woodward Ave., Detroit.

Heinze Electric Co., Lowell, Mass. (Heco.)

Marburg Bros., 1790 Broadway, New York. (Mea.)

Spiltdorf Electrical Co., 98 Warren St., Newark, N. J.

Branches: 10-20 W. 63rd St., New York; 1110 S. Michigan Ave., Chicago; 180-182 Massachusetts Ave., Boston; 1028 Geary St., San Francisco; 972 Woodward Ave., Detroit; 1228 S. Olive St., Los Angeles, Cal.; S. W. Corner Cherry and Juniper Sts., Philadelphia; 1823 Grand Ave., Kansas City; 1628 Broadway, Seattle, Wash.; London, Eng.; Buenos Aires.

MAILING LISTS.

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MASTER VIBRATORS.

New York Coll Co., 338 Pearl St., New York City.

MEASURES.

Dover Stamping & Manufacturing Co., Cambridge, Mass. (Auto and Savol.)

METERS, ETC.

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Northwestern Chemical Co., Marietta, O. (Hydrometers and Thermometers.)

MOTOR STARTERS.

Apple Electric Co., Dayton, O. (Apelco.)

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.

PACKING, FIRE.

Johns-Manville Co., H. W., Madison Ave. and 41st St. New York City.

PAINT, ANTI-RUST.

Northwestern Chemical Co., Marietta, O. (Never-Rust.)

PISTON RINGS.

McQuay-Norris Mfg. Co., Dept. D, St. Louis, Mo. (Leak-Proof.)

POLISH.

International Metal Polish Co., Quill St. and Belt R. R. Indianapolis, Ind. (Blue Ribbon.)

Johns-Manville Co., H. W., Madison Ave. and 41st St. New York City.

Northwestern Chemical Co., Marietta, O.

PRIMERS.

Duelec Vaporizing Primer Co., 14 North Broadway, Yonkers, N. Y. (Duelec Vaporizing.)

PUBLICATIONS, AUTOMOBILE.

The Automobile Journal, 24 issues, \$1.00 the year.

The Motor Truck (Commercial Car), Monthly, \$2.00 the year.

The Accessory and Garage Journal, Monthly, \$2.00 the year.

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PULLERS, WHEEL AND GEAR.

Crane Puller Co., Arlington, Mass.

PUMPS, OIL AND GREASE.

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.

PUMPS, TIRE.

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.

Green & Swett Co., 737 Boylston St., Boston. (Tri-Phoon Car and Garage.)

Shawver Co., Springfield, O.

RADIATOR REPAIRING.

Radiator Fix Co., 121 Massachusetts Ave., Boston. (Rad-Fix.)

REAMERS.

Martell Motor Co., 1928 Columbus Ave., Boston. (Martell Aligning.)

RIMS—REMOVABLE AND DETACHABLE.

Boyd, F. Shirley, 903 Boylston St., Boston. (Dorian.)

United States Tire Co., Broadway and 58th St., New York. (Continental and Whittlesley Demountable.)

Branches: New York, Chicago, San Francisco.

RINGS. (See Piston Rings.)**ROAD BUILDING MATERIALS.**

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Branches: Chicago, Philadelphia, Boston, St. Louis, Cleveland, Pittsburg, Cincinnati, Kansas City, Minneapolis, New Orleans, Birmingham, Ala.; Seattle, London, Eng.; Montreal, Toronto, Winnipeg, Vancouver, Can.; St. John, N. B.; Halifax, N. S.

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Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City. (Asbestos.)

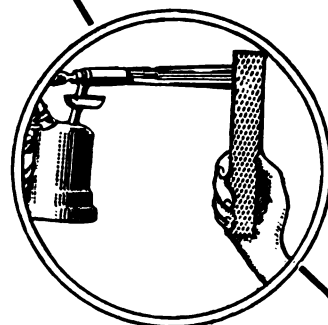
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Boyd, F. Shirley, 903 Boylston St., Boston.

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You Can't Burn It



—not even with the flame of a powerful blow torch—a flame hot enough to melt iron!

This means that the most intense frictional heat has absolutely no effect on the brakes when lined with

J-M NON-BURN BRAKE LINING

This lining is made of pure Asbestos fibres interwoven with strong brass wires. Not a particle of inflammable or perishable material in it. Oil, gasoline, water, grit, etc., cannot affect it. J-M Non-Burn lining stops a car almost instantly in emergencies. Yet, by applying less pressure, you can stop as gradually as you desire. Name is on every piece. Write nearest Branch for sample and interesting booklet and prices to Dealers.

H. W. JOHNS-MANVILLE CO.



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Syracuse 1923



Safeguard your car from wear in bearings and gears—by using

NON-FLUID OIL

This splendid lubricant interposes a strong, oily film between the metal surfaces which prevents their contact. All the wear comes on the lubricant.

NON-FLUID OIL works equally well in cold weather and hot.

NON-FLUID OIL costs less than other lubricants, per mile or per month.

Packed only in orange-colored cans with above trade-mark.

New York & New Jersey Lubricant Co.

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Studebaker

"Accessibility of the motor a leading feature"
 "25"—\$885 "35"—\$1290 "SIX"—\$1550
 All prices for cars fully equipped F. O. B. Detroit.
 STUDEBAKER, - - - DETROIT, MICH.

The Easiest Riding
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MARMON

Thoroughly expressive of the
 highest development of auto-
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Six Cylinders—4 1-2x6—\$4000
 Austin Hydraulic Spring Controllers
 AUSTIN TWO SPEED AXLE
 Some desirable territory still open
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 Grand Rapids, Mich.

THE COLE STANDARDIZED CAR

The car that started the stampede to standardization
 A Cole franchise is a valuable asset to any dealer. Find out about it.

Cole Motor Car Co. of Indianapolis

Dayton Airless Tires

Reduce tire expense
 Cannot puncture or blow-out
 Contain no compressed air

SEND FOR FULL PARTICULARS

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YOU CAN SAVE 15 PER CENT
 of your insurance premium every year by
 installing a Pyrene Fire Extinguisher in a
 convenient and conspicuous place on the
 dash-board of your automobile. For fur-
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PYRENE COMPANY OF NEW ENGLAND
 176 Federal Street, Boston, Mass.

PAIGE "36"—\$1275 "25"—\$ 950

Leaders of popular-priced cars—thoroughly built, completely
 equipped, backed by a strong organization. Specifications and cat-
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 306 21st Street, Detroit, Michigan

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 (J. M.)

Sager Co., J. H., 271 South Ave., Rochester, N. Y. (Peer-
 less.)

SOAPS.

Northwestern Chemical Co., Marietta, O. (Dermalene.)

SPARK PLUGS AND IGNITERS.

Alsten & Goulding Co., 36 Foster St., Worcester, Mass.
 (Alding.)

Bosch Magneto Co., 223-225 W. 46th St., New York.
 Branches: See Magnetos and Magneto Supplies.

Heinze Electric Co., Lowell, Mass. (H. E. Co. Priming.)

Johns-Manville Co., H. W., Madison Ave. and 41st St.,
 New York City.

Mosler, A. R., & Co., P. O. Box M, Mt. Vernon, N. Y. (Split-
 Fire.)

Silvex Company, The, 60 Wall St., New York City. (Beth-
 lehem Five Point.)

Splitdorf Electrical Co., 98 Warren St., Newark, N. J.
 Branches: See Magnetos and Magneto Supplies.

SPARK PLUG TERMINALS.

Johns-Manville Co., H. W., Madison Ave. and 41st St.,
 New York City.

SPEEDOMETERS, RECORDERS, ETC.

Johns-Manville Co., H. W., Madison Ave. and 41st St.,
 New York City. (Electric.)

Northwestern Chemical Co., Marietta, O. (Hydrometers
 and Thermometers.)

Stewart-Warner Speedometer Corp., Chicago. (Auto-
 Meter.)

Branches: 116 Edgewood Ave., Atlanta, Ga.; 925 Boyl-
 ston St., Boston; 720 Main St., Buffalo; 2420 Michigan
 Ave., Chicago; 807 Main St., Cincinnati; 2062 Euclid
 Ave., Cleveland; 1518 Broadway, Denver; 870 Wood-
 ward Ave., Detroit; 330 1/2 North Illinois St., Indian-
 apolis; 1613 Grand Ave., Kansas City; 748 S. Olive St.,
 Los Angeles, Cal.; 1902 Broadway, New York; 302 N.
 Broad St., Philadelphia; 5940 Kirkwood Ave., Pitts-
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 Ave., San Francisco; 611 E. Pike St., Seattle, Wash.;
 3923 Olive St., St. Louis; 559 Yonge St., Toronto, Can.

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Marburg Bros., Inc., 1790 Broadway, New York. (Mar-
 burg-Hagen.)

SPROCKETS.

Boyd, F. Shirley, 903 Boylston St., Boston. (Baldwin.)

STEEL, ETC.

Ward's Sons, E. T., 25 Purchase St., Boston, Mass. (Seam-
 less.)

(Continued on Next Page.)

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(BUYERS' GUIDE—Continued.)

TAIL LIGHTS.

Combination Tail Light Co., 954 Tremont St., Boston.
(Universal Electric.)

TAIL LIGHT DETECTORS.

Harding Specialties Co., Inc., 755 Boylston St., Boston.
(Boston.)

TANKS, ACETYLENE GAS.

Prest-O-Lite Company, 226 Speedway, Indianapolis.
(Prest-O-Lite.)

Branches: See Cylinder Cleaning Compound.

TANKS, TIRE INFLATING.

Prest-O-Lite Company, 226 Speedway, Indianapolis.
(Baby Tire Filler, The Emancipator.)

Branches: See Cylinder Cleaning Compound.

TAPE, ASBESTOS.

Johns-Manville Co., H. W., Madison Ave. and 41st St.,
New York City.

THERMOS CASES.

Dover Stamping & Mfg. Co., Cambridge, Mass.

TIRE ACCESSORIES.

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y. (Holders.)
Shawver Co., Springfield, O. (Tools.)

TIRE CHAIN GRIPS. (See Chains.)

TIRE PRESERVATIVES AND PROTECTORS.

Northwestern Chemical Co., Marietta, O. (Tire-Lac.)

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Braender Rubber & Tire Co., Rutherford, N. J. (Braender.)

Cataract Rubber Co., Wooster, O. (Cataract.)
Branches: Boston, New York, Providence.

Dayton Rubber Mfg. Co., Dayton, O. (Dayton Airless.)

Goodyear Tire & Rubber Co., Madison St., Akron, O. (No-Rim-Cut.)

Branches: In all principal cities.

United States Tire Co., Broadway and 58th St., New York.
(Continental, G & J, Hartford, Morgan & Wright.)

Branches: See Rims—Removable and Detachable.

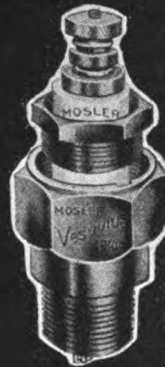
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(Continued on Next Page.)

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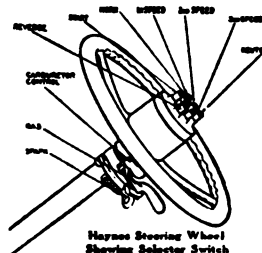
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Next issue March 28th.

Accessory and Garage Journal
TIMES BUILDING, PAWTUCKET, R. I.

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(BUYERS' GUIDE—Continued.)

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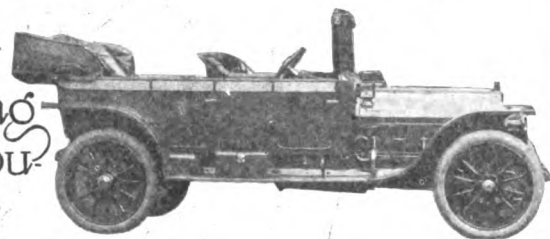
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(Prest-O-Welder.)
Branches: See Cylinder Cleaning Compound.

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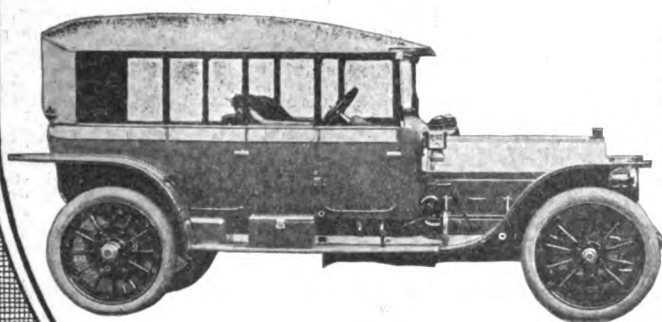
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Cutter, George A., Taunton, Mass.

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SPRINGFIELD

MASS.



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It will tell you more about *Leak-Proof Piston Rings* and their relation to power and cylinder life. Why it will pay you to use them. This book will interest you if you're interested in power conservation. Write for it.

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and repair shops.

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APR 29 1914

VOL. XXXVII.

NO. 4.

AUTOMOBILE JOURNAL

*\$1.00 the year
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PAWTUCKET R.I.

March 25, 1914

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We do not claim that VEEDOL will eliminate ALL friction; that as it burns it will deposit absolutely no carbon—there never will be a PERFECT lubricating oil.

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New York City

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The Oldest and Largest Automobile Supply House in America

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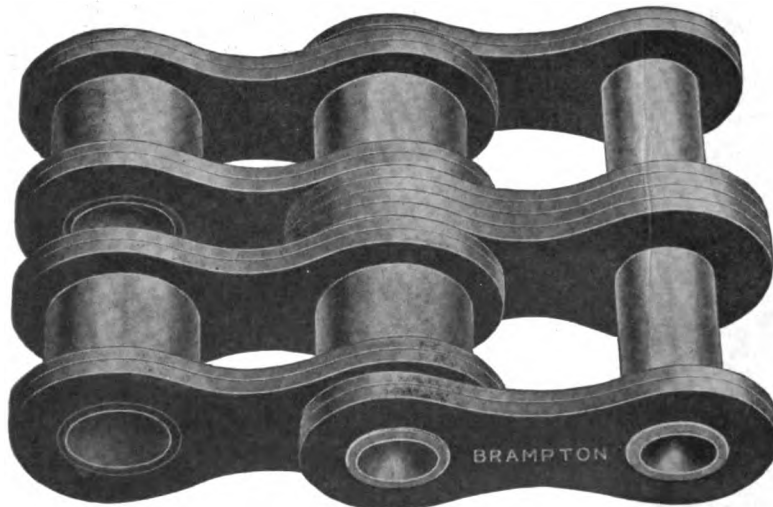
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Overlands
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the air

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984
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high

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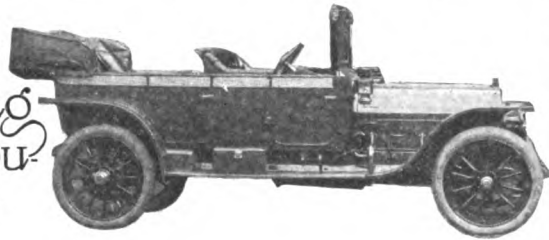
JOHN H. GRAHAM & CO.

29 Murray St. New York City

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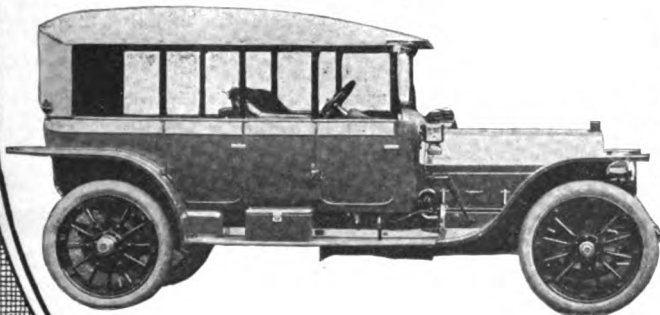
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the accommodation and protection you desire.

Can be raised or low-

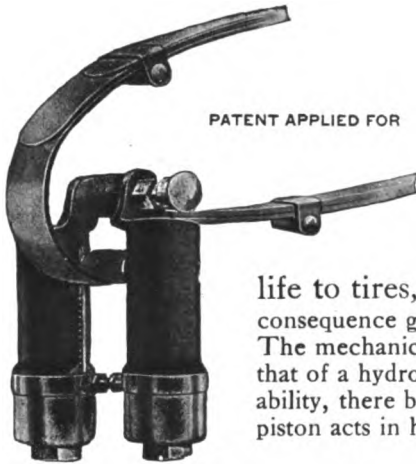
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SPRINGFIELD

MASS.

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are a revelation as well as a revolution in spring suspension.

Their sensitiveness of action **AUTOMATICALLY** takes up and destroys jars and jolts, either heavy or light, and to the occupant of a car it seems like riding on air—fairly floating through space.

Vibration is eliminated, thus giving long life to tires, motor, transmission and other components. In consequence greater speed is possible, as the car does not tend to skid or roll. The mechanical principle of the J. H. S. Shock Absorber is as scientific as that of a hydro-carbon engine. A cylinder and piston are used to insure durability, there being no fragile parts to wear or easily get out of order. The piston acts in harmony with coiled springs which destroy all shocks.

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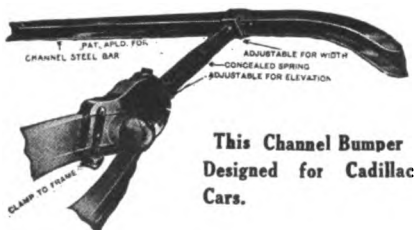
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Stimulate Your Dealers' Business. Create a Demand for Your Lines Among Owners, Operators and the Trade. Quality, Quantity, and 100 per cent. Circulation Value Buyers Will Read

THE ANNUAL OVERHAUL AND EQUIPMENT NUMBER OF



The April 25 issue of The Automobile Journal, while a regular edition, will, as is customary at this season of the year, specialize in the overhaul, repair and equipment of the pleasure motor vehicle.

Preparing the car is the one subject that is claiming the attention of every car owner and operator at this time. Practical and comprehensive discussions dealing with all that is necessary in the overhaul, replacement of parts and equipment is eagerly sought by owners, operators and the trade.

Manufacturers of tools, machinery, garage equipment, supplies, accessories and those conveniences economizing in time and labor should give careful consideration to this edition. It will reach those who own, operate and maintain their cars and at a time when they are in the market and are spending money.

The following partial synopsis of contents emphasizes the extent that the April 25 issue will deal with the above subjects and make clear the value of this edition to readers and advertisers alike:

Value of the overhaul and method of ascertaining its extent.
What the owner may accomplish and suggestions for preparation.
How the repair bill may be considerably reduced.
Tools, supplies, etc., necessary in the work and how to select them.
Preparing the cooling system, cleaning and repairing.
Overhauling the power plant and replacing worn components.
Cleaning and adjusting carburetors and fuel tanks.
Attention necessary with lubricating systems.
Cleaning, adjusting and timing magnetos.
Cleaning and adjusting the transmission and replacing worn parts.
Importance of a thorough overhaul of the steering gear.
Relining brakes and inspection of the rear axle.
Steps necessary in placing the storage battery in service.
Electric lighting and starting equipment for heavy and Ford cars.
Accessories and equipment making for comfort and convenience.

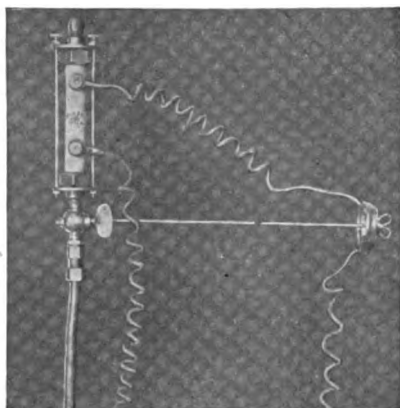
Automobile Journal Publishing Co.

Times Building

Pawtucket, R. I.

Immediate Start **Greatly Increased Mileage**
Greater Power, Greater Speed, Greater Hill Climbing
Ability If You Have a

Duelec Vaporizing Primer and Economizer



(Patent Applied For)

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PRIMER AND ECONOMIZER—\$7.00

Attaches to intake manifold, at any location, in any position, operates from switch on dash. Half hour installs it.

OPERATION.

Turn on switch, give engine quarter turn, either by cranking, or by starting mechanism. A drachm of fuel (gasoline, kerosene, denatured alcohol, etc.,) is drawn from main feed line, enters heating chamber, is vaporized, inhaled by cylinder. The first spark explodes this **HOT, FUMING, VAPORIZED** charge. **YOU'RE OFF.**

The economizer begins operating as the engine speeds up. Feeding **HOT** air, resulting in great reduction of fuel consumption, vastly increased power and speed.

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No extra fount of gasoline, or risky mixtures required.

No incessant, tiresome, dangerous cranking.

No unnecessary, expensive spinning by self-starters.

No complicated mechanism. Works automatically.

SUPPLIES HOT, FUMING, VAPORIZED FUEL, for starting, and **HOT** air through economizer.

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DUELEC operates from **MAGNETO**. Uses only $\frac{1}{4}$ ampere. We will refund price, if it does not prove superior to any device to promote easy starting, and increase power with decrease of fuel consumption.

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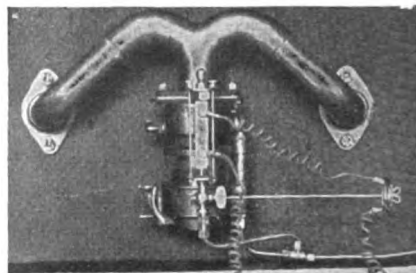
Starter, Engine, Cyclecar and Auto Manufacturers.

Send for **DUELEC**. We will submit one for trial and comparison.

Have your engineer test and compare with anything on the market.

Place your order accordingly. Patents allowed and pending.

Make remittance to order of **U. S. Traub**.



(Patent Applied For)

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14 North Broadway **Yonkers, New York**

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THE ANNUAL BUYER'S AND SELLER'S NUMBER

OF THE

ACCESSORY AND GARAGE JOURNAL

APRIL ISSUE

Analyze the distribution of this edition. The following tabulation emphasizes the quality and worth of the readers. The service and distribution is backed by any guarantee requested by users of space. The figures tell the story. The April number of the Accessory and Garage Journal will accord advertisers the greatest circulation to trade interests ever offered. It is the buying season. It is your time to sell.

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Latest Copy Date April 23

ACCESSORY & GARAGE JOURNAL

Times Building

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Pawtucket, R. I.

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THE AUTOMOBILE JOURNAL PUBLISHING COMPANY
Times Building Pawtucket, R. I.

PUBLISHER'S COMMENT.

The Annual Overhaul and Equipment Number of The Automobile Journal will be issued April 25. In preparing the special articles on these subjects particular attention will be paid to the needs of the new owner—the man who is approaching the period of the annual overhaul for the first time—and the discussions will present the various steps in a manner devoid of technical terms so that the details of the work may be understood readily by the novice. With respect to the equipment of the machine for the active driving season, effort will be made to include all the latest accessories and fittings, with special reference to those installations which have been developed for equipping older models with those devices making for comfort and economy now supplied regularly as standard equipment. Order your copy now—direct or through your news dealer.

Complete Specifications of gasoline pleasure cars made in America for the 1914 season were published in the Feb. 25 issue of The Automobile Journal. Equally complete data respecting commercial vehicles were presented in the March issue of

Motor Truck, published by this company. In anticipation of an increased demand for these numbers, extra copies have been prepared, and readers who are interested in these details may be supplied, at the regular rates—The Automobile Journal, 10 cents; Motor Truck, 20 cents.

Particular Attention is drawn herein to numerous commercial vehicle installations, supplementing the review of the Boston truck show, and it seems of interest to add that each issue of Motor Truck contains invaluable information for the business man who is contemplating the purchase of such equipment. All the regular departments of the Journal have also been retained in this number, including New Accessories (page 35), Suggestions for New Owners (page 42) and Correspondence with Reader (page 53).

Do Not Overlook the Buyers' Guide on pages 87-96, inclusive, when in need of anything new in cars, accessories, supplies and fittings. The concerns listed are wholly reliable and worthy of your consideration. And when corresponding with advertisers please mention The Automobile Journal.

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THE AUTOMOBILE JOURNAL

VOL. XXXVII, No. 4

MARCH 25, 1914

Price, \$1.00 the Year

TRUCK SALES AGGREGATE \$1,000,000.

Boston Display, Only Commercial Motor Vehicle Exhibit of National Prominence This Year, Proves Right to Classification with Annual Pleasure Car Show.

PRODUCTIVE of consummated sales that were estimated to aggregate fully \$1,000,000, and of prospects that ought to increase this total very largely, as well as stimulating interest that will undoubtedly result in profitable business, the third annual show of service vehicles of the Boston Commercial Motor Vehicle Association, which was concluded at Mechanics' building the evening of March 21, was from every point of view a success. This exhibition, the national

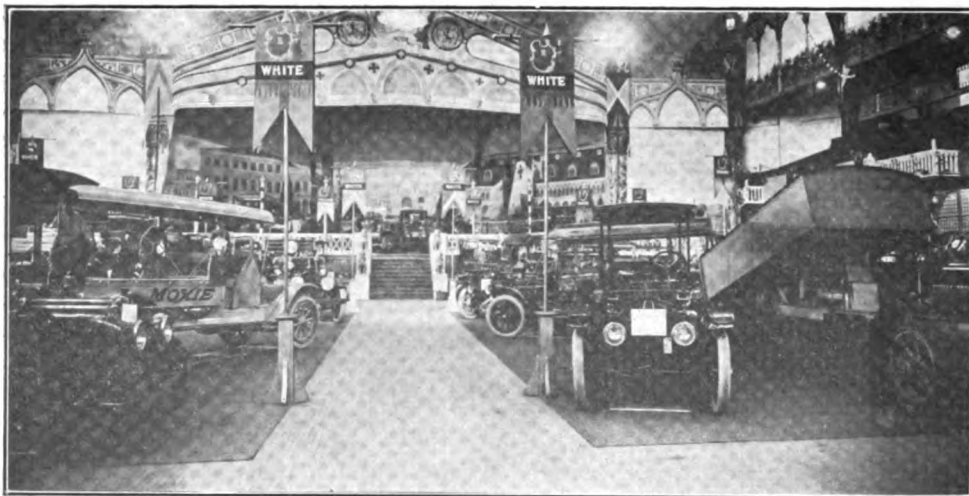
display of motor trucks and wagons, and the only exploitation of machines that will be made in this country this year, was attended by approximately 50,000 persons, or an average of 10,000

daily, which is undoubtedly a record for a show of this character.

Viewed from any aspect the show was all that could be desired — from the standpoint of the management, the organizers, the exhibitors and the visitors—it being complete and representative of the industry and including practically



General View of Grand Hall from the Balcony, Showing the Principal Truck and Wagon Exhibits on the Main Floor.



The Main Aisle in Grand Hall, Looking Through the Exhibit of the White Company, Toward the Stage, on Which Was the Packard Display.

every type of vehicle recognized as a commercial proposition. The exhibit was comprehensive from the fact that it included the latest developments of types and models, and was also noteworthy from the fact that there was not a freak construction displayed. As a matter of fact one might say that the show was of designs that had been proven and their worth established, and from this aspect demonstrated to the visitors that the industry has settled down to building vehicles that are thoroughly dependable so far as principles are concerned, and the variance is frequently in quality of material and workmanship rather than in designing.

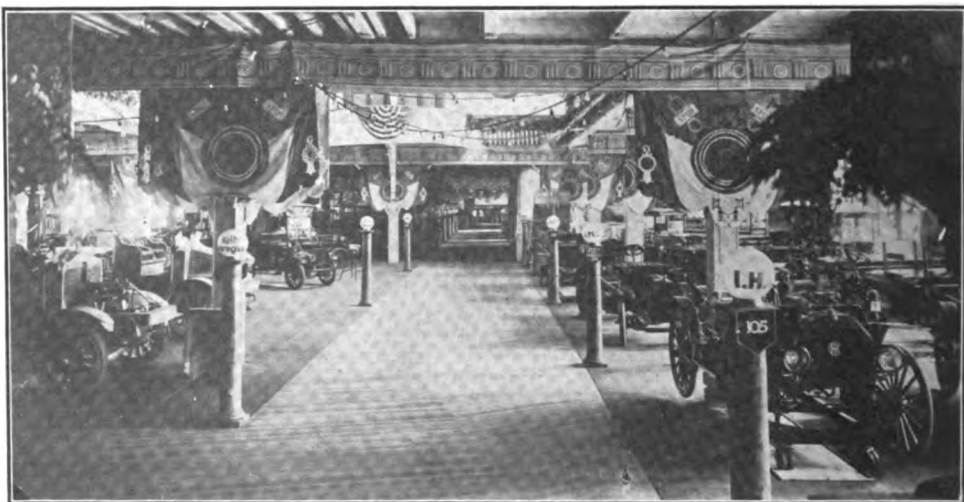
The Boston show attracted to it people from all sections of New England, New York, New Jersey and the British provinces, and with the majority of the visitors the interest was keen. The exhibitors without exception were represented by the most expert of their salesmen and often by factory representatives, and no opportunity was lost through absence of selling force, which has in past years been a fault with many of those making display. The necessity of having men always available to meet the visitors was understood and this was

one of the reasons why the exhibition was so productive.

In all there were 34 different makes of machines shown, there being 32 makes of gasoline vehicles and two of electric and one steam, one concern producing both gasoline and electric. The total number of complete chassis, with or without bodies, was approximately 150, and with rare exceptions

no display was made of components or special parts, the belief being that the public is sufficiently informed relative to constructional detail and does not need specific demonstration of machine work and material. In some instances, however, where a new principle is employed, specimens of the construction were shown for the purpose of the better informing those who desired instruction.

The exhibition was confined principally to the main floors of Exhibition and Grand halls, but the balconies of each was open for the convenience of those who desired to be apart from the exhibits or to listen to the concert programmes. The showings of accessories were comparatively few, these being generally of lubricants and the like, while in one corner were several power



The Main Aisle of Exhibition Hall, Looking Toward the Principal Entrance, Showing the Kelly and I. H. C. Exhibits in the Foreground.



The Stand of the Whitten-Gilmore Company, at Which Was Shown the Exhibits of Standard Trucks and Federal Wagons.

launches which had been displayed by a concern that profited largely by being represented.

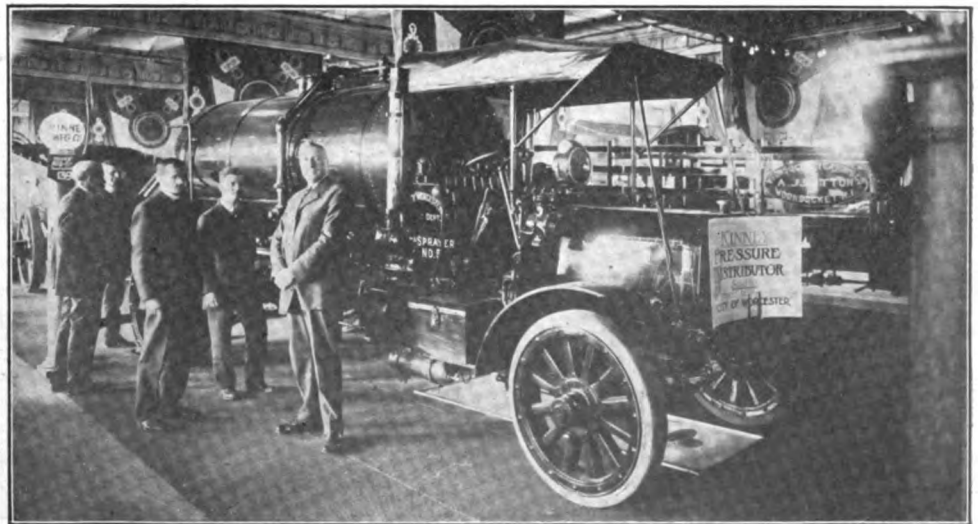
Of decided interest was the construction of the motors used, and two only showed two-cylinder engines, these being the Autocar and the I. H. C., the latter built by the International Harvester Company. These two concerns have utilized this form of motor constantly and have practically continued one design each, though the I. H. C. engine is cooled by water or by air as desired. Both these motors are the horizontal opposed types. The Merz parcel post delivery, and the Parcel Post light wagon, have vertical, two-cylinder, air-cooled motors in which the cylinders are set at an angle of 90 degrees. The Chase Motor Truck Company had two types of three-cylinder, air-cooled motors, and the Palmer-Moore delivery wagon shown was fitted with a three-cylinder, water-cooled motor. Both Chase and Palmer-Moore engines are two-stroke cycle. The Palmer-Moore motor is also built air-cooled, and the Chase company builds a four-cylinder, water-cooled engine. All other motors shown were the conventional four-cylinder, four-cycle, vertical, water-cooled types, the variance being with

reference to bore and stroke, valve location and lubrication.

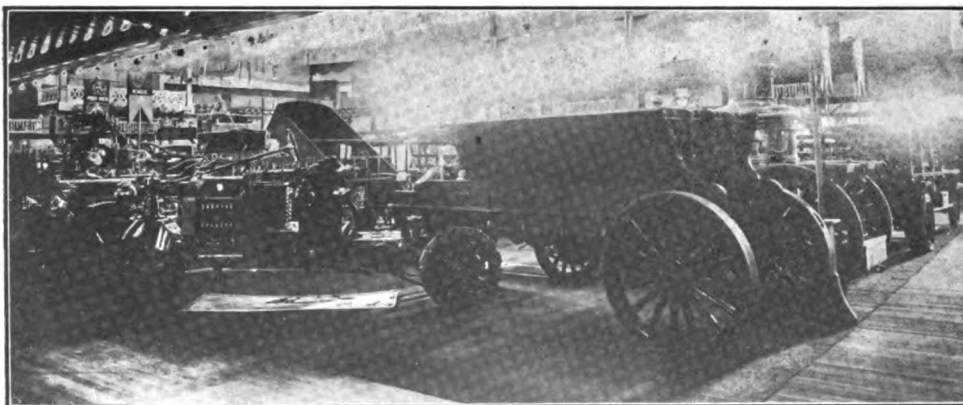
Two new worm and gear driven machines were shown, these being the Atterbury 3000-pound wagon and the three-ton Chase truck, and these machines are distinctive from the fact that in both the designers have followed foreign practice and abandoned

the use of radius rods, driving the vehicles through the rear springs. The same principle is applied in both constructions. The forward hanger of the rear spring is heavy and on this the spring is mounted with a large eye that is formed from the master and long leaves, but the rear end of the spring is shackled so as to have free movements. The Atterbury spring is seated on the rear axle, but the Chase spring is underslung. Both, however, are comparatively flat, so that the driving thrust may be as nearly horizontal as is possible. This construction necessitates a very long hanger in the Chase truck. The Universal, the other worm and gear drive machine shown, has been constructed for about a year and a half.

The Walter five-ton truck shown was con-



The Combination Tank Truck of the Kinney Manufacturing Company, Adapted for Street Watering, Oiling or Tar Application on a Peerless Chassis.



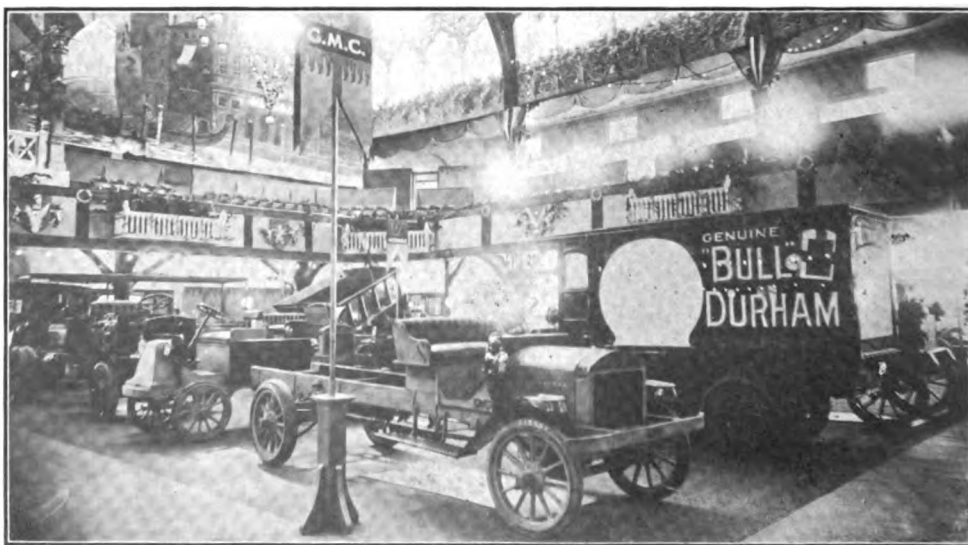
The Exhibit of the Knox Automobile Company, Grand Hall, with a Knox-Martin Tractor and Trailer with Dumping Body.

structed under the Latil patents, and with such adaptations as are believed desirable for American service. This is a front wheel driven machine and the drive is from a unit power plant by a countershaft that drives spur pinions meshing with internal gears carried in housings on the front wheels. The rear wheels roll free and may be shod with steel or rubber tires, but the forward wheels are fitted with block shoes. The forward springs are fitted with centre bands that are shrunk on while hot, which insures against movement at the spring saddles. The rear hangers are fitted to mount the springs with bronze bushed eyes on heavy bolts, but the forward ends are shackled, this construction taking the deflection and the engine torque when starting. One of the innovations is the connection of the foot or service brake to act on the four wheels, and still greater clamping effort is applied to the rear wheel brakes by the use of the emergency hand brake. The four-cylinder block motor, clutch and gearset, assembled as a unit, is mounted at the forward end on a trunnion carried on the front frame cross member, and suspended near the rear end from a curved steel cross member by four large bolts. By removing the front cross frame

member and the four bolts, and breaking the exhaust, water, fuel and ignition connections, the chassis may be pushed back, or the power plant may be hoisted from the frame. The machine is made in three, four, five, six and 7.5-ton capacities. The company is also making a four-wheel driven

tractor in sizes up to 12 tons hauling capacity. this being steered by four wheels as well. The rear wheels are driven in precisely the same manner as the forward wheels, a propeller shaft extending to a differential of a second countershaft mounted above the rear axle. This tractor is expected to carry a four-ton load and draw two four-ton trailers.

The Merz parcel car was the only friction machine exhibited, this being a cyclecar chassis fitted with a box behind a cab that will seat a single person. The Stanley steam vehicles and the Buffalo and the GMC electric machines were practically unchanged from the designs of a year ago. The fire apparatus shown by the White, Knox and the I. H. C. companies was of combination types, and the Knox-Martin tractor with a converted horse steam fire pump completed the



The Display of the General Motors Truck Company in Grand Hall, Showing the Special Body Built for the Animated Advertising Company.

exhibit of motor driven apparatus of this nature.

One of the interesting exhibits was the new Kelly five-ton truck, which is practically the same design as the smaller machines. The Little Giant delivery wagon shown is an entirely new design, this having a four-cylinder, water-cooled, en bloc motor, a pressed steel channel section frame, larger wheels and tires, and many other details of relative lesser importance. The four and six-ton Packard machines were displayed, these following practically the standard design of the company. The Pierce-Arrow two-ton machine was exhibited for the first time, but this has been in the market for six months or more. The Velie new one-ton machine was shown with and without body. This is a conventional design, having a 45 horsepower four-cylinder motor with constant level circulating lubrication system and Bosch dual ignition, multiple disc clutch, selective type transmission gearset, and a propeller shaft to a full floating rear axle. The motor, radiator, clutch and gearset are carried on a sub-frame. The chassis is equipped with an electric starting and lighting system.

One of the incidental constructional details of interest was the use of the Daimler leather disc universal or flexible joint between the clutch and the gearset in the Stewart machines and at the ends of the driving shaft of the Chase two-ton truck, between the clutch and the gearset, and at the ends of the propeller shaft of the Chase three-ton machine.

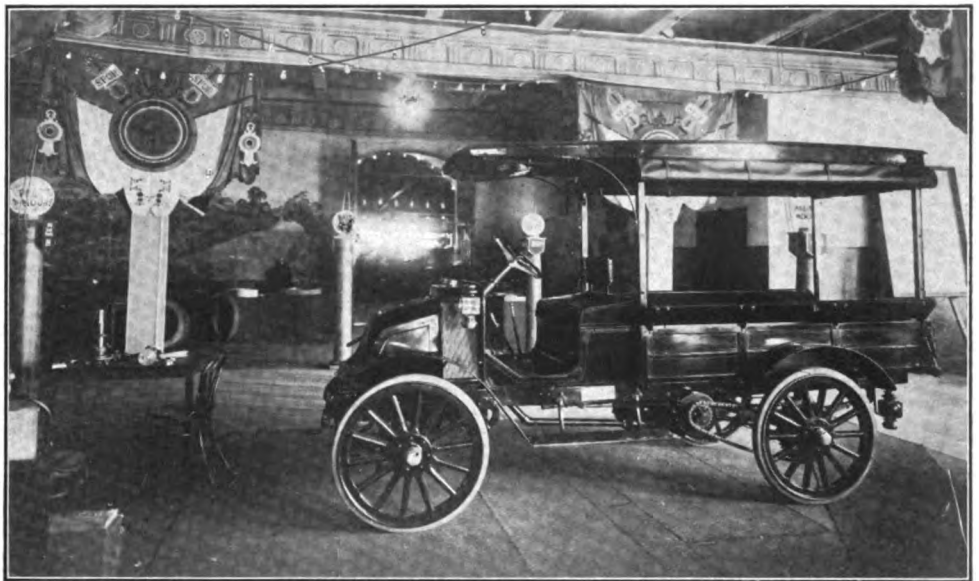
The display of bodies was unusually large and complete, ranging from 3000 to 10,000 pounds capacity with the dumping equipment, practically all of the machines shown being fitted with power hoists. Some admirable special body work was exhibited, including the panel types with individual decorations, and a unique display was a body built for the Animated Advertising Company with panels of glass on a GMC chassis, in which animated advertising is

to be shown by means of reflected electric light supplied from a large storage battery. This is one of a number of gasoline and electric machines that will tour the country. The progress made in body building was marked, and this equipment attracted much attention.

ARGO PLANT IN RACINE.

Latest Briscoe Organization Has Secured Factory for Production of Motors, Etc.

While it was announced recently that the Argo Motor Company, of which Benjamin Briscoe is one of the controlling forces, was to locate in the vicinity of New York City, the latest information respecting this concern is that it has ac-



The Palmer-Moore Delivery Wagon, Equipped with a Three-Cylinder, Two-Cycle, Water-Cooled Motor and Four-Post Express Body.

quired the plant formerly occupied by the G. W. Jagers Company in Racine, Wis. The company was organized for the purpose of producing a low priced, light weight pleasure car, practically in the cyclecar class.

It is explained that the Racine factory is to be used for the manufacture of motors and transmissions. It affords a floor space of about 125,000 square feet. It is added that machinery valued at \$35,000 will be installed and that work on these components will be begun shortly. It is also understood that the radiators will be produced in the plant of the Briscoe Motor Company in Jackson, Mich. Evidently it is intended to locate the assembling plant in New York State, unless the plans have been changed.

DAWSON AND A MARMON.

Two Well Known Names Added to Entry List for the International Sweepstake Race.

According to the latest information from Indianapolis, Ind., Joseph Dawson will drive a Marmon car in the fourth annual 500-mile race for the international sweepstake award on the speedway in that city, Memorial Day. The car is entered by a private individual and not by the Nordyke & Marmon Company, its maker, since that concern announced its withdrawal from racing some two years ago.

It was in a Marmon car that Ray Harroun took the first 500-mile race in 1911. Harroun is interested in the Maxwell team this year, although it is stated that he does not intend to drive in the event. Dawson won the second race in 1912, at the wheel of a National car, setting a new record for the event, which was not exceeded last year by Jules Goux in a Peugeot. Goux and his Peugeot are entered again this year. As a result of this latest entry interest in the forthcoming event has been increased very materially, since representatives of the winning combination in each of the previous races will be taking part.

BIG BUSINESS FOR REO.

Record Mark Attained in Both Production and Sales at Factory in Lansing, Mich.

The demand for Reo cars and trucks is keeping both factories of the Reo organization, the Reo Motor Car Company and the Reo Motor Truck Company, in Lansing, Mich., working overtime of late. Last year, at this time, 40 Reo cars a day was regarded as the limit of production. With the buildings which were added recently, and the increased factory facilities, the production has gradually increased to 65 a day, and there have been many busy days during the past few weeks when the shipments have run up to 90 cars a day. It is stated that there are over 2000 orders already on the books for delivery during April.

An immense amount of new machinery was installed last fall. One large building was added to the Reo factory for storing cars, but that structure has been empty practically all of the time. This appears to have been the only mistake made by the Reo organization, since it failed to properly gauge the popularity of the Reo the Fifth cars, and the ability of the sales depart-

ment to place these machines as fast as produced.

The truck end of the Reo business has witnessed much the same success. The officials of the company state that it is safe to predict a business in this field double that of last year, which was a new record for the company.

NEW OFFICERS ELECTED.

United States Rubber Company Adds a New Name to the Directorate.

The annual meeting of the United States Rubber Company was held March 17, at which the number of directors was reduced from 21 to 20, no one being elected to succeed the late J. Howard Ford. All of the retiring directors were re-elected, with the exception of Commodore E. C. Benedict, who is withdrawing from all business connections. He was replaced by Col. Samuel M. Nicholson of Providence, R. I., president of the Nicholson File Company and the Providence Screw Company.

At the meeting of the directors March 20, the following officers were elected for the ensuing year: President, Samuel P. Colt; vice president, James B. Ford and Lester Leland; vice president in charge of tire and mechanical goods department, Elisha S. Williams; vice president in charge of footwear, Homer E. Sawyer; vice president in charge of development department, Raymond B. Price; treasurer, W. G. Persons; secretary, Samuel Norris, and assistant secretary, John D. Carberry.

ORGANIZE NEW COMPANY.

Two Well Known Ignition Salesmen Establish Headquarters in Washington, D. C.

Charles Rubel, for a number of years connected with the Connecticut Telephone & Electric Company, Meriden, Conn., has resigned as sales manager of that concern. With Elmer H. Hohenthal, formerly connected with the Bosch Magneto Company, he has organized the Charles Rubel Company, with headquarters at 1312 14th street, N. W., Washington, D. C., for the purpose of acting as manufacturers' representative.

A two-story building has been secured and will be completely equipped for handling ignition and lighting systems and carburetors. This will include a good sized machine and electrical shop, in charge of Percy R. Haycock, for four years superintendent of service for the R. M. Owen Company, New York City.

SPARK PLUG ASSOCIATION.

A Statement of What It Expects to Accomplish for Such Manufacturers.

As previously stated in these columns, the spark plug manufacturers recently formed a national association, which now has a membership representing 80 per cent. of the makers. Work already has begun looking toward the correction of various trade abuses, which are held to have developed through the wonderfully fast growth of the industry.

Another most important object of the association is to bring about a better realization on the part of the individual manufacturers of the trade mark value it is possible to create in their plugs. This is expected to establish friendly competition along lines which will undoubtedly result in the improvement of the entire product.

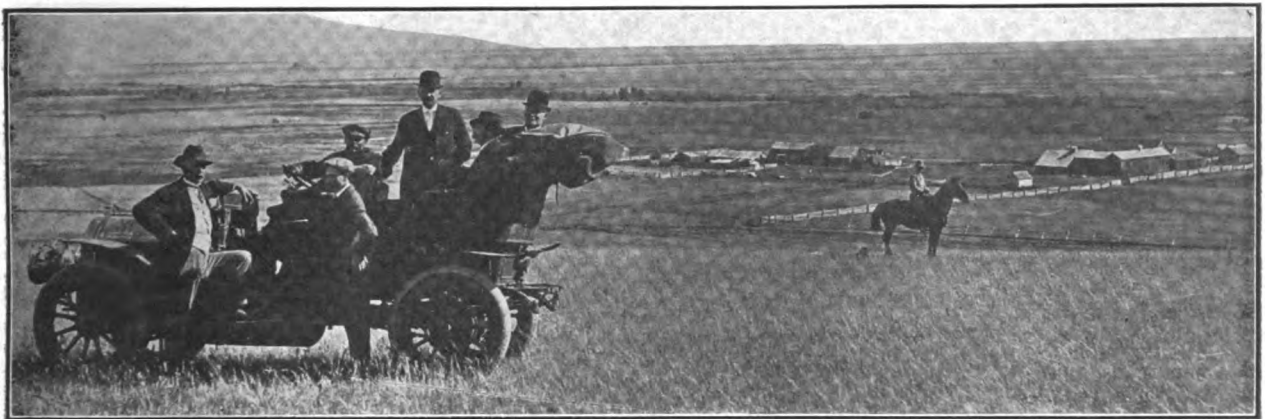
are wrapped so as to leave a clear circular space in the centre, are to be measured on the outside diameter for length and the circumference of the casing as the girth.

In measuring a tire which is wrapped so as to form a circular shaped parcel without a perfectly clear space in the centre, the outside diameter of the parcel is to be taken at the length and twice the diameter and thickness as the girth.

PIERCE-ARROW'S BIG MILEAGE.

Montana Owner Reports 170,000 Miles of Service Under Unusual Conditions.

An accompanying illustration shows a Pierce-Arrow car, made by the Pierce-Arrow Motor Car Company, Buffalo, N. Y., which has seen 170,000 miles of service, according to a recent report from the owner, the Wm. H. Brown Company of



Pierce-Arrow Touring Car That Has Seen 170,000 Miles of Service Under Unusual Conditions with Montana Real Estate Concern.

J. Waterman Fischer, Jr., is secretary of the association and he also is sales manager for the Silvox Company, New York City, maker of the well known Bethlehem Five-Point plug. He will be glad to receive any communications regarding the new association at his office, 60 Wall street, and will furnish detailed information whenever requested.

TIRES BY PARCEL POST.

Postmaster-General Burleson Issues Order Permitting Transmission in This Manner.

Automobile tires may be dispatched by parcel post, according to an official order issued by Postmaster-General Burleson, countermanding a previous order forbidding their receipt as mailable matter. Under this latest order tires which

Hobson, Mont. The conditions under which this machine has been operated are decidedly unusual, and the report has additional interest because of that fact.

The Brown company is in the real estate business, and has large tracts of wheat and alfalfa lands for sale. In showing prospective customers over the property, it is necessary to cover a good deal of territory. There are all kinds of roads, but often whole days are spent looking over lands where there are no roads at all. This means that the car is called upon to traverse rough prairie, stubble and plowed fields.

An official of the company says the car often is overloaded, and adds: "I do not know of any other make of car that will stand the hard work we give them. We have had a number of other makes, but have never been able to get the mileage that we do out of our Pierce-Arrows".

GROWTH OF MOTOR TRUCK INDUSTRY.

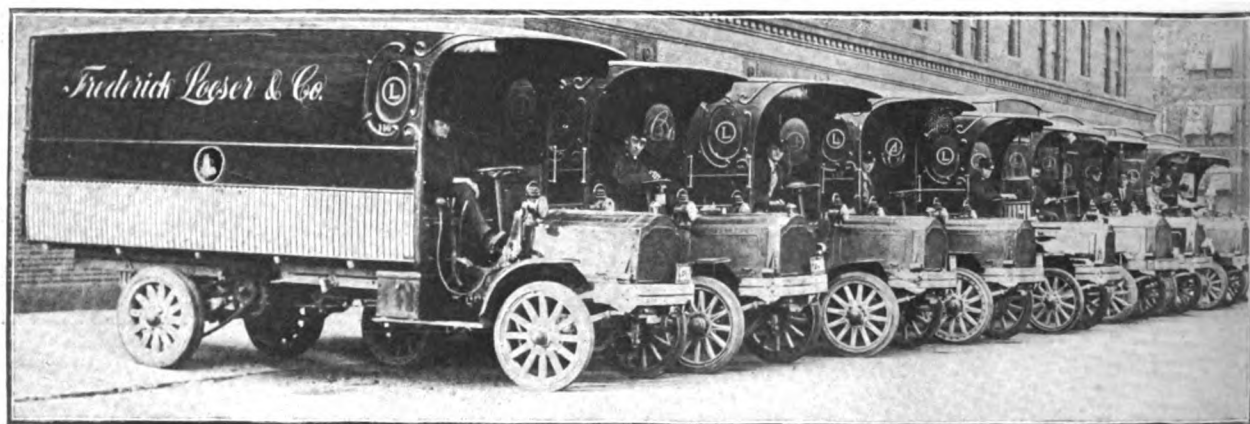
A Few Examples Indicating the Wide Field of Service for the Mechanical Transport and the Manner in Which the Manufacturer Seeks to Co-Operate with User.

WHILE it is practically impossible to obtain reliable statistics indicating the exact number of commercial motor vehicles in use in America today, a conservative estimate would place the figure at somewhere between 50,000 and 75,000. Probably the grand total is even larger than this, since a large number of converted pleasure cars are included in the list, and it is extremely difficult to draw a line, other than by defining a commercial vehicle as a machine that is used for business purposes. Obviously, this definition is too broad, but it impracticable to limit statistics to the one phase of mechanical haulage. Elsewhere in this issue will be found discussion dealing with specific features, and the purpose in this instance is to direct attention to

steam, but as yet this type of road vehicle has not secured the same prominence in America that it has abroad, although there are a few steam trucks in operation in this country.

Spirit of Co-Operation.

The first power wagons were pleasure car chassis equipped with service bodies. The industry had not yet learned that it was necessary to build a vehicle which must be suited to the work it was expected to do. If the manufacturer was not aware of this, it hardly could be expected that the business man was better informed. It may be added, however, that both manufacturer and user soon discovered that something was radically wrong. Much has been accomplished in these few years, and today the business man



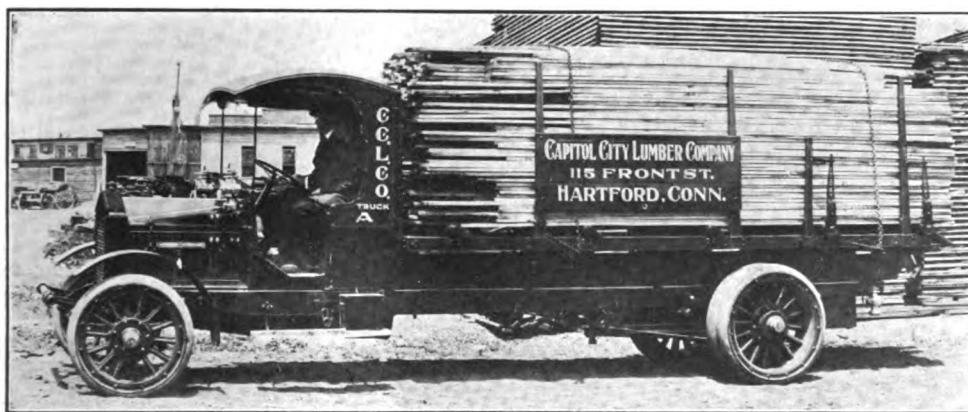
A Portion of the Fleet of Gasoline Trucks Utilized by Frederick Loeser & Co.'s Department Store, Brooklyn, N. Y.

machines employed in what might be termed general utility service.

Because of the magnitude of the automobile industry, and of this branch in particular, it is possible, in the space available, to do little more than suggest a line of thought. Within the past few years the widespread interest in motor trucks and business wagons has afforded sufficient opportunity for all to become more or less familiar with the fact that such vehicles are utilized for an ever growing number of purposes. The thoughtful observer cannot stand on the street corner in hardly any city or town in the United States without discovering some new field in which the gasoline or electric motor has won a place. The writer had almost included

who desires to secure the superior advantages of the mechanical transport, readily obtains the heartiest co-operation of the producer, to the end that he shall be supplied with that type of vehicle best suited to his individual needs.

It would seem safe to say that there is practically no field in which the motor truck has not established itself, and yet, so diversified are the needs of the industrial world, manufacturers are continually being confronted with new problems. Usually, however, these involve the body equipment rather than the chassis construction, and, because of this factor, it is the usual practise of the manufacturer to list but a few standard body designs, leaving the matter of special bodies to be solved by a maker who specializes in that field.



Pierce-Arrow Five-Ton Truck Which Does the Work of 11 Horses in Service with Capitol City Lumber Company, Hartford, Conn.

The reason is not far to seek. The necessary equipment and capital required to meet every need of this nature would seriously handicap the facilities for producing chassis and work against that proper service which the present day motor truck maker seeks to render.

Department Store Delivery.

Some specific examples of installations have been selected as indicating the various lines in which motor trucks have been utilized with wide success, these being presented in accompanying illustrations. Frederick Loeser & Co., Brooklyn, N. Y., may be cited as an example of the department store delivery service. This concern had 300 horses some nine years ago. At the time this photograph was taken, 204 of these had been replaced by 28 electric and 14 gasoline machines. It follows that a store located in that city must have secured much additional business in the interim, so that the 42 motor vehicles were required to do a great deal more work than the 204 horses they replaced. The company keeps a careful record of its machines, and knows exactly what to expect of each. The plan may differ materially from that in use by other concerns throughout the country, many of whom utilize fleets of wagons of

a similar character.

The difficulties presented in department store service are by no means so many nor so varied as those which are confronted in many other fields. Those who have had experience with motor vehicles are convinced that there is little question as to the economy that can be effected, but

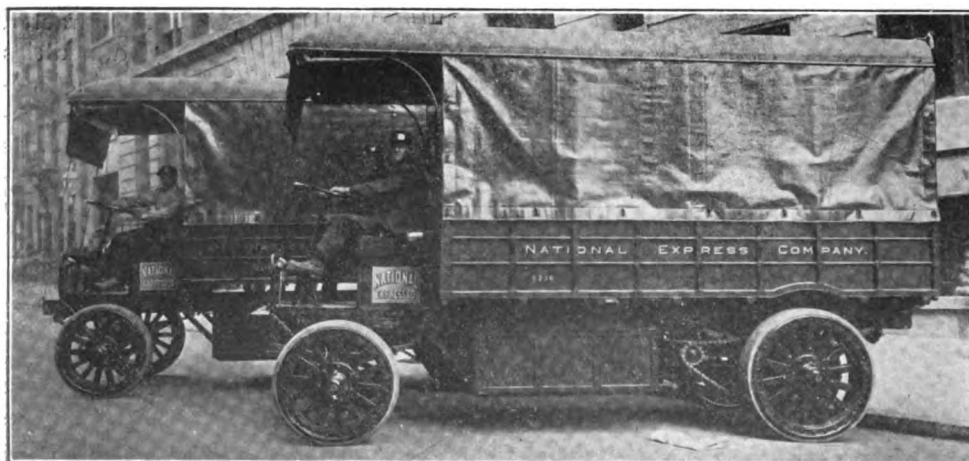
to secure the utmost economy it is necessary that the machines shall be worked as nearly as possible to their fullest capacity. This involves the means for loading and unloading. With the department store, the former is solved by arranging the shipping facilities so as to secure the greatest efficiency. It would prove impractical to discuss this phase of the subject to any length in the space available here.

Lumber and Coal.

Both loading and unloading present problems in the lumber business. In the case illustrated the chassis platform is fitted with rollers. The lumber is loaded on a four-wheeled wagon in the yards, while the truck is absent making delivery. Upon its return the load is transferred to the truck with very little loss of time. Of course the unloading is simplified in the same



Knox-Martin Tractor Hauling Nine Tons of Coal in Service with M. S. Converse Company, Springfield, Mass.



Express Companies Are Large Users of Motor Vehicles, Although Not All Are Electrically Propelled.

manner. This particular truck shows an efficiency equal to that of 11 horses, and an economy represented by a cost of 36 cents a 1000 feet as compared with 75 for a two-horse team, according to the figures of the company.

Other concerns have solved their specific problems in other ways. Generally speaking, however, it has been determined that the most satisfactory method involves the use of extra wagons of some character. One lumber dealer in Cambridge, Mass., utilizes electric trucks, the load being arranged on two-wheel carts, the front end being carried on the truck itself. Another large dealer in Providence, R. I., who makes a specialty of handling heavy mill construction lumber, uses a Knox-Martin tractor and specially designed wagon, the lumber being loaded by huge cranes. In every instance it has been demonstrated to the satisfaction of the user that the motor vehicle is both economical and efficient.

Coal may be loaded by overhead chute, but special bodies are often necessary to facilitate quick dumping of the load. An example of such equipment is found in the combination utilized by the Springfield

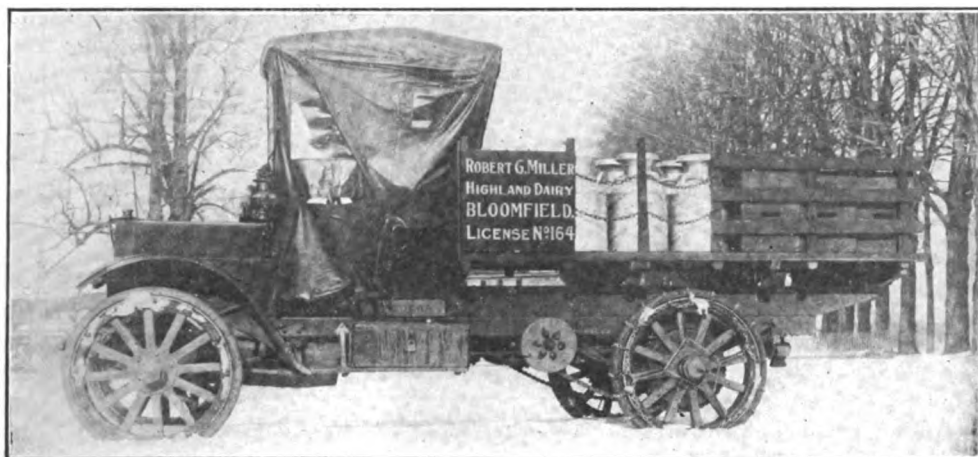
house, as illustrated herewith. The body was specially designed to hold five tons, and the interior walls slope toward the centre, so that it is a simple matter to fill a basket by opening a slide at the side. The motive power is a Knox-Martin tractor, which may be available for a large number of purposes. That it is capable of hauling heavy loads

is exemplified by the photograph, which shows a load of nine tons, four tons being carried in bags on top of the main load.

In this particular instance, the custom is to carry coal from the street, in making household deliveries, and this practise cuts down the efficiency of the equipment somewhat. Where it is possible to make delivery direct, either by dumping the load through a hole in the sidewalk or into a chute, other plans may be followed, although the tractor equipment shown is available for this purpose. Some body makers provide sectional bodies, each section holding a ton of coal and each dumping separately, so that it is possible to make several deliveries along a route without loss of time in returning to the yard.



Peerless Four-Ton Machine That Paid for Itself in Seven Months Moving Household Goods with Concern in Worcester, Mass.



Federal One-Ton Truck Which Supplants Four Horses in Milk Delivery at a Daily Cost of \$3.50 for Farmer in Bloomfield, Conn.

There are unlimited possibilities for the general teaming and transfer companies. Within the past two years trucks have been used to decided advantage in long distance moving work, where the load is that of household goods. It would prove decidedly interesting to consider this topic at some length. The example cited depicts a Peerless truck in service with Henry Masse, Worcester, Mass., who states that he ceased to keep track of the expense of the vehicle after it had been in service some seven months, since it had paid for itself and showed a handsome profit on the investment at that time. That it is possible to secure satisfactory returns on the investment in short hauls of the general transfer character is borne out by the very large number of trucks and delivery wagons, both gasoline and electric, owned and operated in many cities by the established express companies.

alone. He owns 10 horses, but they do farm work only. And the truck handles a number of odd jobs, besides delivering milk, among them being the oiling of 32 miles of road in the towns of Bloomfield and Grandy.

Extending Business Radius.

The Lincoln Safety Deposit Company finds its fleet of six General Vehicle electric trucks of decided value in securing new customers. Its business is that of maintaining vaults for the safe keeping of property, and the machines are utilized in transferring the goods between the vaults and the homes of its patrons. They cover a radius which embraces Stamford, Conn., a round trip distance of 35 miles.

The Maine Creamery Company has utilized trucks in the delivery of ice cream over a wide area for several years. Last year it produced 200,000 gallons. Not only are the trucks em-



Four of the Fleet of Six General Vehicle Electrics in Service with the Lincoln Safety Deposit Company, New York City.



Packard Trucks Engaged in Hauling Ice and Delivering Ice Cream for Maine Creamery Company, Providence, R. I.

ployed in the delivery of this product to stores and other consumers, but other trucks are used in hauling the ice from its storage plants. The example indicates the availability of motor vehicles in both fields, although in this instance the ice haulage is for private consumption rather than household delivery.

In the latter service, motor trucks have been found of exceptional value in hauling ice from the ice houses to a central distributing point, there to be transferred to horse drawn wagons for house to house delivery. This plan also is followed in numerous other lines, notably the delivery of groceries, etc., in the suburbs, and sometimes gasoline machines are utilized for this long haul work, while electrics are employed in the service where frequent stops are to be made.

In Contract Haulage.

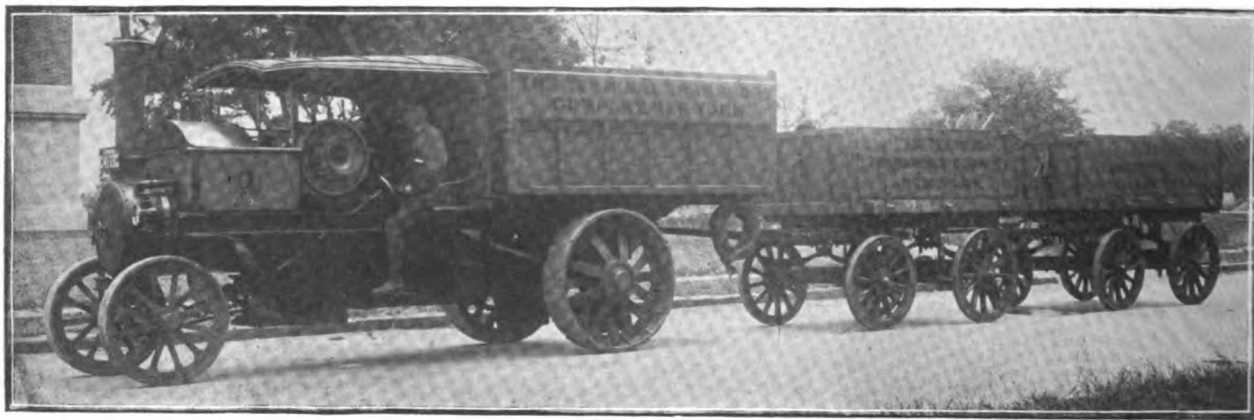
But one example of steam haulage is shown, this being the installation employed by the Terminal Transport Company, New York City, in undertaking contract work in that city and vicinity. The machine is an English product, as are the trailers. The former is capable of carry-

ing 7.5 tons, while the trailers each hold three tons. In practise one trailer is left at each end of the line, while a third is being towed en route. The company owns two of these trucks and three trailers. The ton-mile expense with

these vehicles has figured out at 15 cents.

Contract haulage offers an exceptional opportunity for the truck to demonstrate its economy and efficiency, but it often is necessary to devise some means for quick loading or unloading. The tractor and trailer method is growing in favor, and a number of manufacturers are specializing in such equipment, either with tractors or trailers. Other makers have brought out specially constructed bodies arranged to be dumped by the power of the motor propelling machine.

As has been stated, no attempt has been made to exhaust the subject. The examples cited merely indicate a few of the many fields in which trucks are constantly being used to advantage. Highway haulage is rapidly assuming a position of decided importance in the business world, and, in its many ramifications, is of such deep practical interest as to merit extended consideration. Our contemporary, Motor Truck, is devoted solely to this branch of the industry, and in each number different phases of commercial vehicle service are treated in a manner calculated to make an appeal to the thoughtful business man.



Foden Steam Truck and Two Trailers in Contract Haulage with Terminal Transport Company, New York City.

IS EASTERN REPRESENTATIVE.**W. S. Jewell Will Cover New England, New York, New Jersey and Pennsylvania.**

The Marion Motor Car Company, Indianapolis, Ind., announces the appointment of W. S. Jewell as eastern sales representative, in charge of the territory embracing New England, New York, New Jersey and Pennsylvania. He is one of the veterans in the trade, and is widely and favorably known throughout the industry. For some few months he has been manager of the New York house handling Marion cars, and his appointment may thus be looked upon as a distinct advance and extension of his duties and powers.

Mr. Jewell became identified with the industry some 12 years ago, when he joined the company formed by Richard Croker and other New Yorkers for launching the first taxicab service in the United States. Previously he had been connected with a series of successes in electric street railway operation. Later he joined the staff of the H. H. Franklin Manufacturing Company, as manager of the New York branch. After three years he became general manager of the Motors Engineering Sales Company, distributor for the Kelly truck in the East. Still later he took over the metropolitan district for the R-C-H Corporation, with headquarters in New York, but directing sales in Philadelphia and Boston as well. His connection with the Marion company dates from last summer.

ALLEGES INFRINGEMENT.**Maker of the Gasolock Brings Patent Suit in United States District Court.**

According to information from Detroit, the Headlight Support Company of that city, maker of the Gasolock, has brought suit in the United States court for that district against the Esco Manufacturing Company, also of Detroit, alleging infringement of patent No. 1,025,105, granted to F. E. Youngs on an application filed July 8, 1908.

It is maintained by the complaining company that the claims of the patent are sufficiently broad to cover every possible type of device which employs a lock for controlling the flow of fuel oil from the fuel tank to the engine. It is also held that this patent has been infringed unwittingly by many users of automobiles, who have permitted locking devices of this type to be

installed on their cars by persons not licensed by the Headlight Support Company, which states that it will protect its patent in the courts against deliberate infringements.

THE RAYFIELD TROPHY.**Punch Bowl and \$1000 in Gold Goes to Winner of This Year's 500-Mile Race.**

Announcement is made by the Findeisen & Kropf Manufacturing Company, Chicago, maker of the Rayfield carburetor, that it will offer a handsome punch bowl, to be known as the Rayfield trophy, to the winner of the fourth annual 500-mile race on the Indianapolis motor speedway, May 30, providing the car is equipped with a carburetor of this make. In addition to the trophy, which is valued at \$2000, and which becomes the permanent possession of the driver winning it twice in a Rayfield equipped machine. \$1000 in gold will go to the driver. The driver finishing second will receive \$300 in gold and the one in third place will receive \$200, under the same provision in each instance.

**Rayfield Carburetor Trophy.**

The Rayfield trophy is a massive punch bowl of solid sterling silver, gold lined and made from an original design. It stands 17 inches high, is 16 inches in diameter and 20 inches wide from handle to handle. Around the top of the bowl is a beautifully arranged border, divided into four parts; two panels forming the front and back, illustrate the speedway and show racing cars going at full speed, all cleverly hand wrought.

The Firestone Tire & Rubber Company, Akron, O., announces that it will market cyclecar tires in four sizes, 28 by 2.5, 28 by 2.75, 28 by three and 29 by 2.75 inches. It is understood that these tires have been subjected to road tests in and about Akron, and other experiments, during the past two years. Red and gray inner tubes also will be produced to fit these sizes.

INCREASE IN SALES.

Electric Storage Battery Company Makes Public Its Annual Statement.

The Electric Storage Battery Company, Philadelphia, Penn., has made public its annual report for 1913, showing gross sale of \$1,558,123, as compared with \$1,536,190 during 1912. The total net income was equal to 6.71 per cent. on the \$18,000,000 capital stock, \$155,000 of which is preferred, as compared with 6.25 per cent. for the previous year. The comparative table follows:

	1913	1912
Gross sales, less cost, mfg., etc.	\$1,558,123	\$1,536,190
Operating expenses	522,205	512,354
Net	\$1,035,917	\$1,023,835
Other income	172,837	101,443
Total net income	\$1,208,755	\$1,125,279
Less dividend	649,964	649,964
Surplus	\$558,797	\$475,315
Previous surplus	2,855,525	3,318,080
Less adj. net	101,793	*937,871
Total surplus	\$3,312,522	\$2,855,525

*Consists of an allowance of \$808,400 for depreciation of United States Motor Company securities, \$48,539 loss in value (undepreciated) of old buildings replaced by new factory, and \$128,741 deducted for sundry adjustments and items not incident to the current year, partially offset by an addition of \$47,619, representing the par value of bonus stock of Chloride Electrical Storage Company, Ltd.

HIGH SCHOOL COURSE.

Plans Under Way Looking Toward Addition of Automobile to the Curriculum.

Plans are being formulated by George D. Strayer and Thomas H. Briggs, professors of the education department of the Teachers' College, Columbia University, looking toward the introduction of the study of automobiles in the high schools of the United States as a subject just as important as any other for the student to take up. This became known recently as the result of a visit by these two men to the University of Indiana, at Bloomington, Ind., where Prof. R. F. Myers of the high school division of that institution, has been using the Cole Technical Bulletin and a Cole car in teaching the subject of physics.

Prof. Myers contends that to the average high school pupil's mind an automobile has been something that runs and gives pleasure. But what makes it run, the functions of the various parts of machinery, gas expansion, its electrical appliances, etc., have been a mystery. As a mat-

ter of fact, it should not be, he declares, because the most important principles of physics can be clearly defined in the motor car.

It appears, however, that Prof. Myers is not the only instructor to utilize the Cole treatise, which was prepared by Chief Engineer Charles S. Crawford of the Cole Motor Car Company, Indianapolis, Ind., in this manner. Other schools in the United States which are conducting similar classes are: Engineering department, University of Michigan, Ann Arbor, Mich.; department of mechanical arts, University of Arkansas, Fayetteville, Ark.; department of journalism, New York University, New York City; department of industrial arts, Mechanics Institute, Rochester, N. Y.; and the high schools in Terre Haute, Evansville, Marion, Shelbyville, Rochester, Logansport, Kokomo, Petroleum, Mishawaka, Wabash and Gary, Ind.

NEW BRANCH MANAGER.

Stewart-Warner Speedometer Corporation Announces Changes in Two Cities.

Frank M. White, who was formerly manager of the Stewart-Warner Speedometer Corporation's New York branch, and who for the last two years has been at the company's factories in Chicago, has returned to his former position in New York City, while F. O. Fleischer remains as office manager.

J. J. Hildebrecht, who has been manager of the Pittsburg branch, has taken up his new duties as special salesman for the company. His place has been filled by the appointment of A. T. Henderson.

MERCER MOTOR ON WATER.

Cincinnati Man Buys One for Installation in His Power Boat America.

In view of the record breaking performances of Mercer cars, made by the Mercer Automobile Company, Trenton, N. J., on tracks and highways, it is interesting to note that Mercer speed is no longer to be confined to land. Perhaps a Mercer motor may be utilized even for flying one of these days, but it is sufficient for the purposes of this item to state that one has been installed in the power boat America.

The owner of this boat is Max C. Fleischman of Cincinnati, O. He recently purchased the motor and shipped it to Jacksonville, Fla., where it was fitted to the America. On its first trial run it showed a speed of 58 miles an hour.

SMALL PARCEL DELIVERY VEHICLES.

A Somewhat New Branch of the Industry, in Which the Needs of Merchants and Others for a Light, Fast Means of Making Deliveries Are Given Consideration.

EVEN the butcher, the baker and the candlestick maker—if the last named individual is still doing business, and, if not, his present day counterpart—may find exactly the type of vehicle adapted to their needs. This should not be taken to mean that the offerings of the automobile industry in this particular field are limited in any manner to the specific lines mentioned. There are many concerns which find use for a small parcel delivery car, and it is to these that the type of vehicle under consideration is expected to make a direct appeal.

Back in the early days of the industry's history—about 1903, if memory serves correctly—the Knox Automobile Company of Springfield, Mass., produced what has ever since been regarded as the first parcel delivery car. This was to specifications supplied by Smith & Murray, a large department store in that city, which desired a rapid means of delivering small packages about the city and suburbs. This equipment proved to be a decided success from a practical viewpoint, and other machines of a similar character were produced by this manufacturer and others. However, it is within a comparatively short time that the industry has given this type special consideration.

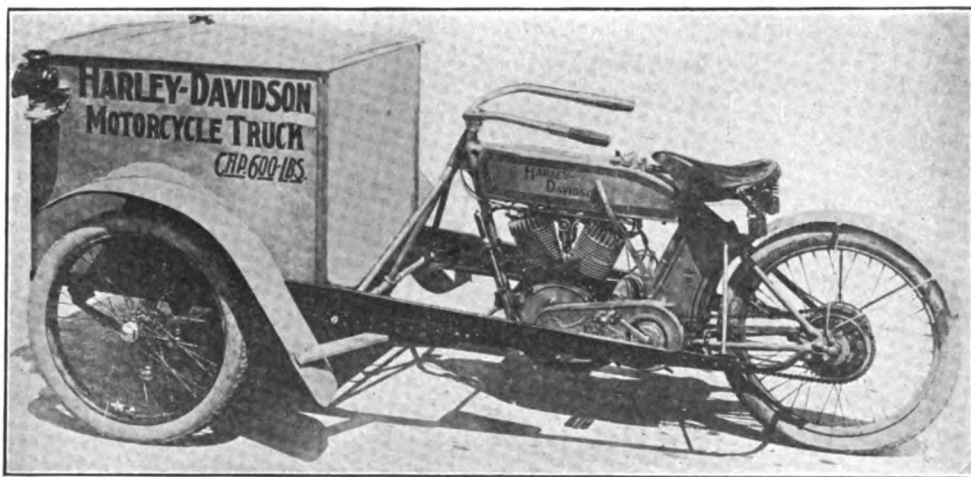
The demand has existed, and in many instances it has been supplied by the motorcycle manufacturer with the delivery van, either in front or at the side of the motorcycle proper. This combination has its distinct field of usefulness, and it hardly will be contended that other types of vehicles will entirely supplant it, but particular attention is drawn at this time to a number of new machines which have made their appearance more recently.

These virtually may be divided into three classes, although there is the same tendency to-

ward confusion that exists in an attempt to classify passenger vehicles, in that one of these classes must be designated as a cyclecar. A second might be termed—indeed, it is termed by some makers—a motorcycle truck, while the third is a miniature delivery wagon. Some of the last named have three wheels and others four. It readily will be seen that it is a difficult matter to classify these machines in a manner satisfactory to all concerned. All are designed primarily as parcel delivery wagons.

Motorcycle Trucks.

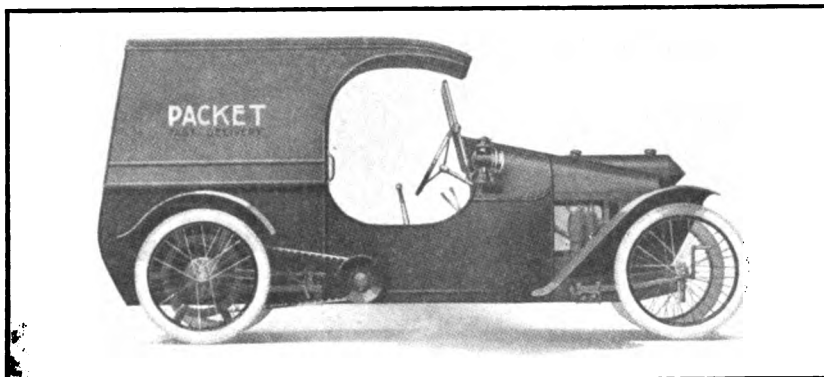
Typical examples of the so-called motorcycle truck are the products of the Harley-Davidson Motor Company, Milwaukee, Wis., and the Minneapolis Motor Company and Shapiro-Michael-



Latest Type of Motorcycle Package Carrier Is Represented by Harley-Davidson.

son Motor Company of Minneapolis, Minn. Each of these comprises the regulation motorcycle frame, insofar as the rear wheel, saddle and motor support are concerned, but the front forks are replaced by stronger supports which connect with a chassis frame carrying a delivery van between two wheels at the front, and with side frame members extending backward to the rear wheel hub. This type of construction is brought out very clearly in the illustration of the Harley-Davidson shown herewith.

It will be seen that this design is a direct outgrowth of the motorcycle, although the construction is with an idea of permitting much larger loads to be transported than with the motorcy-



The Packet Cyclecar Delivery Wagon Model Made in Detroit.

cle and van attachment. The Michaelson is rated at 300 pounds capacity, the Minneapolis at 500 and the Harley-Davidson at 600. In general design they are very much alike, but the details have been worked out differently, as might be expected. The Michaelson and Minneapolis are fitted with single-cylinder engines, and the Harley-Davidson with a twin.

Cyclecar Delivery Wagons.

Since the advent of the American cyclecar, a number of the manufacturers engaged in the production of these machines have announced delivery car models. It must be remembered that the cyclecar situation at present is that of a new business which is not actually established. By this is meant that the product is still in an experimental stage, and, even with those manufacturers who are prepared to produce machines, there is as yet some little indecision as to exact features of design and construction. It is probable that other concerns will announce delivery car models as soon as they are in a position to make definite arrangements concerning their product.

It is by no means certain that the following list of cyclecar delivery wagons includes all which have been announced, but they will serve to indicate the features of the type: Imp, Imp Cyclecar Company, Auburn, Ind.; Comet, Comet Cyclecar Company, Indianapolis, Ind.; La Vigne, La Vigne Cyclecar Company, Detroit; Packet, Scripps-Booth Cyclecar Company, Detroit; Merz, Merz Cyclecar Company, Indianapolis; A. C., Autocycle Company, New Orleans, La., and Twombly, Twombly Car Corporation, New York City. All of these are made with the package com-

partment at the rear, instead of at the front as with the so-called motorcycle trucks.

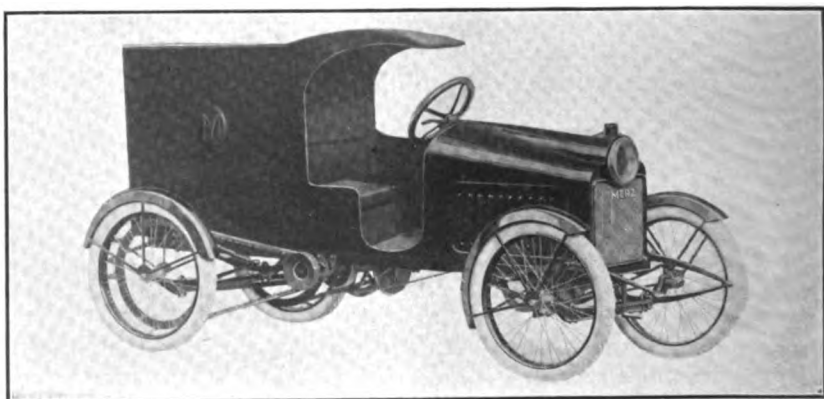
The Imp, Comet, Merz and Packet are true cyclecars, under the definition of the Cyclecar Manufacturers National Association. That is, they have motors with piston displacement of less than 71 cubic inches. The A. C., La Vigne and Twombly are light cars, under the same definition, these having motors with piston displacement of larger capacity. As a matter of

fact, these definitions really apply to the pleasure car models, but it is assumed that they will be made to apply to the delivery cars as well.

Some Constructional Details.

The Imp uses a two-cylinder engine, with bore of 3.375 inches and stroke of 3.875; friction transmission and V belt drive, and is rated at 300 pounds capacity. The Comet has the same rated capacity, and is fitted with a two-cylinder engine, with bore of 3.5 inches and stroke of 3.675; expanding ring clutch, planetary transmission and V belt drive. The Merz has a motor of the same size and type as the Comet, friction transmission and V belt drive. Its capacity is placed at 500 pounds. The Packet has a two-cylinder engine, with 3.5-inch bore and 3.66-inch stroke; disc clutch, planetary transmission and V belt drive. The rated capacity is 350 pounds. With all of these the motors are air-cooled.

Of the light cars mentioned: The La Vigne has a four-cylinder, water-cooled motor, with bore of 2.375 inches and stroke of four; multiple disc clutch, sliding gear transmission, and drives by shaft and worm gear. Its capacity is 400 pounds. The A. C. also has a four-cylinder, water-cooled motor, the dimensions of which have



The Merz Cyclecar Delivery Wagon Produced in Indianapolis.

not been made public. Drive is by shaft, and the capacity is not stated. The Twombly motor has four cylinders and is rated at 15 horsepower. Cooling is by water, thermo-syphon system. A friction transmission, single-chain drive and two-speed rear axle are employed. The carrying capacity is 500 pounds.

Specially Designed Wagons.

The vehicles which have been mentioned must be regarded as practical in every way, but they are distinguished from those of the third class, in that, while they are specially designed insofar as their application to the work for which they are intended is concerned, they are more or less closely identified with passenger machines. The motorcycle truck is a motorcycle redesigned for a specific commercial service, and the same thing may be held to be true, at least in a measure, with respect to the cyclecar delivery wagon. The third class is held to be designed throughout for business purposes.

It may be stated in this connection that it is not considered essential that a machine shall be specially designed, throughout, in order to be enduring in the light, fast work for which such cars are usually employed. It depends very largely upon the class of service in which it is intended to utilize the car. There are lines in which it undoubtedly would prove most advisable to have a machine more sturdily constructed, and it is for such work that the vehicles in this third class are primarily intended, although, of course, they are equally capable of supplying the service for which the other two types are particularly adaptable.

Light Commercial Car.

One of these machines is the Light commercial car, made by the Light Commercial Car Company, New York City. In some respects this machine resembles a motorcycle truck and in others a cyclecar delivery wagon. For instance, it is equipped with handlebars instead of the regulation steering wheel, and it has a two-cylinder, air-cooled motor rated at nine horsepower, which is located directly in front of the rear wheel and beneath the seat. It should be understood that the Light is a three-wheel vehicle, all three wheels being of wire and fitted with 26 by three-inch heavy tread tires. The wheelbase is 66 inches and the tread 46. The van is located in front, and is rated at 600 to 800 pounds carrying capacity.

The motor is supplied from a 2.5-gallon gasoline tank at the back of the seat. Ignition is by high-extension magneto or battery. Drive is by roller friction or standard chain as desired, and

the speeds are said to be from two to 35 miles an hour on the high and 10 miles an hour on the low, both being direct. An external contracting brake, 10 inches in diameter and one-inch in width, is applied to the rear wheel hub, this being actuated by pedal. Springs are semi-elliptic. The throttle control is by grip on the right handlebar, and spark control at the centre and just below the handlebars. The speed control is by two pedals.

Wagenhals Tricar.

The Wagenhals is another three-wheel machine, made by the Wagenhals Motor Company, Detroit, although this differs materially from the machine just described. Instead of being located under the seat, the motor is under a hood midway of the chassis, just behind the van. This is a water-cooled, four-cylinder unit, with bore of 3.5 inches and stroke of 3.375, cast in parts. This



The Wagenhals, a Three-Wheel Package Car.

drives through a cone clutch and planetary transmission, final drive to the rear wheel being by chain. Control is by pedal in the centre. The springs are semi-elliptic. The wheelbase is 80 inches, and the van in front has capacity of 800 pounds. Wheels are of wood, fitted with 30 by three-inch tires in front and 34 by 4.5 inches in the rear.

Parcel Post Kar.

The Parcel Post Kar is the product of the Parcel Post Equipment Company, Grand Rapids, Mich., and is a four-wheel machine with carrying capacity of 500 pounds. The van is located in front, and the motor is between it and the seat. The van portion is made detachable, and may be lifted off with ease, exposing the engine for work or adjustment.

The motor is a two-cylinder, air-cooled V type, with bore of 3.5 inches and stroke of 3.5625.

Ignition is by Bosch high-tension magneto, and carburetion by a Schebler. The clutch is a multiple disc and the sliding gear transmission affords three forward speeds and reverse. Final drive is by chain, running in oil. Brakes are external, inside the rear axle housing, and are fitted with cork inserts. The springs are semi-elliptic in front and full elliptic in the rear. The wheels are of wire, fitted with 30 by 3.25-inch tires.

The MotoKart.

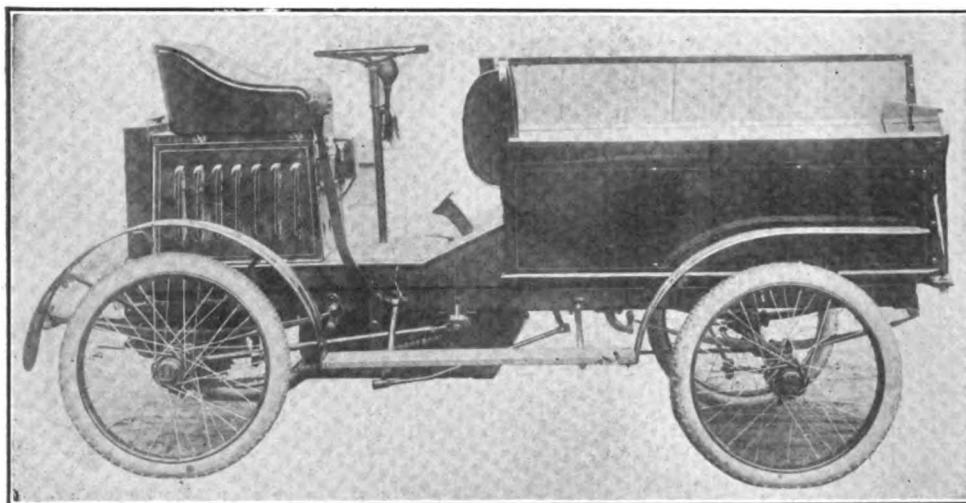
The MotoKart is made by the MotoKart Company, formerly the Tarrytown Motor Car Company, with offices at 1790 Broadway, New York City, and factory in Tarrytown, N. Y. This is a specially designed machine which differs from the others, in that the motor is located under the seat, which is over the rear axle, and the chassis is mounted on four wheels. The van is in front,

axle by single chain. The frame is of pressed steel channel section, mounted on semi-elliptic springs, the driving thrust from the rear axle being taken by radius rods. Wheels are of wire, fitted with 26 by 2.5-inch tires, of the non-skid motorcycle type.

Control is by a vertical steering column and hand wheel located in the centre of the floor-board, and by an accelerator and pedal that actuates the driven disc. A hand lever at the right operates the driven wheel on the jackshaft. The brake is actuated by another pedal. The chassis is fitted with running boards and fenders, and a tool box is carried on the left running board.

From the examples cited, it will be noted that it is possible for the merchant or other establishment to secure a machine which will best meet individual needs. The list has by no means been exhausted. In fact, new machines of

one type or another suggested herein, are being announced very rapidly, particularly in the cycle-car field. All of those mentioned are listed at a moderate price; at a figure which compares very favorably with that which would be paid for a horse and wagon, in the open market. And when consideration is given to the range of movement, speed and cost of upkeep



The Motokart, a Specially Designed Parcel Car, with Motor Located at the Rear.

and has a normal capacity of 400 pounds. A feature of the equipment emphasized by the maker, is that its size and weight are such that it may be housed in the store after business hours. The wheelbase is 69 inches and the tread 44. The dimensions of the van are: Length 51 inches, width 32 and height 32. The overall length of the machine is 106 inches, the overall width 52 and the extreme height 52. The weight is approximately 700 pounds.

The motor is a two-cylinder, four-cycle unit, with bore of 3.63 inches and stroke of four, this being rated by the maker at 10-12 horsepower. The cylinders are cast singly. Cooling is by water, thermo-syphon system, through a large honeycomb radiator. A friction transmission affords an unlimited range of speeds, and power is transmitted from the jackshaft to the live rear

axle by single chain. The frame is of pressed steel channel section, mounted on semi-elliptic springs, the driving thrust from the rear axle being taken by radius rods. Wheels are of wire, fitted with 26 by 2.5-inch tires, of the non-skid motorcycle type.

Correction of Error—In the March 10 issue in New Accessories for the Motorist an illustration of the Mosco Ford wheel puller was utilized in a description of the Mosco anti-rattling ball socket. This was an error. A description of the Mosco Ford wheel puller will appear in the April 10 issue of The Automobile Journal.

The Galveston Electric Company, Galveston, Tex., reports a Studebaker automobile, made by the Studebaker Corporation, Detroit, which has been in continuous service for four years and has acquired a definite record of over 200,000 miles.

GENERAL NEWS OF THE INDUSTRY.

Kissel Company Gives Up Philadelphia Branch--Chalmers Concern to Take Over New York Agency--Page Joins Owen in Handling Entz Transmission.

THAT there is still some little difference of opinion among automobile manufacturers as to the advisability of maintaining branch houses for the distribution of cars, is borne out by the activities of the past two weeks. Following the plan adopted in Chicago, the Kissel Motor Car Company, Hartford, Wis., has abandoned its KisselKar branch in Philadelphia, the business being transferred to the Gibbons-Wetherill Company, which already handled the Maxwell line. This concern recently leased the three-story building vacated by the Alco Company, and as a result has one of the best equipped service stations for pleasure cars and trucks in the city.

Practically coincident with this announcement comes the information that the Chalmers Motor Company, Detroit, is to take over the business heretofore conducted in New York City by the Carl H. Page Company, as agent for Chalmers cars, and the plant will be operated in the future as a Chalmers branch. It should be stated, however, that this information has not as yet received public confirmation, those interested declining to confirm or deny the report. It is impossible to suggest whether or not the deal will include the other Page companies in several Connecticut cities.

It is understood that Mr. Page, who has been connected with the industry in New York City for many years, is to withdraw from the sale of Chalmers cars entirely, combining his interests with those of R. M. Owen, who recently gave up the distribution of Reo cars, in the promotion of the Entz electric transmission.

NEW STUTZ PLANT.

Additional Details Concerning Factory of Well Known Indianapolis Concern.

As stated in the last issue of The Automobile Journal, the Stutz Motor Car Company, Indianapolis, Ind., has begun work on its new plant at

10th street and Capitol avenue, on property recently purchased from Harry S. New. It will adjoin the factory occupied by the former Stutz Auto Parts Company, which is now a part of this concern. An accompanying illustration indicates the character of structure which it is proposed to erect.

The new building will be one of the most up-to-date automobile plants in Indianapolis. It will have a frontage of 80 feet on Capitol avenue and 204 feet on 10th street, and will be four stories in height. The material will be concrete with brick facings, and steel frame windows will furnish an ample supply of light.

The general offices and the assembly plant, which are now located at 430 North Capitol avenue, will occupy the first floor. The offices will



New Plant Which Stutz Motor Car Company Will Erect in Indianapolis, Ind.

be on Capitol avenue, and back of these will be a storage room for such heavy parts as frames, motors, transmissions and axles. The second floor will contain the first and final assemblies, and the third floor will house the paint shop and finishing department. The fourth floor will be used as a top building and upholstery shop.

Porte-cocheres will be erected at both the Capitol avenue and 10th street entrances, and a big sign, displaying the unique Stutz trade mark, and bearing the slogan, "The car that made good in a day", will be built into the top part of the centre of the structure. It is estimated that the new factory will cost over \$100,000. It will be used entirely for manufacturing purposes, the city salesroom being retained in its present location.

ANNOUNCES NEW OFFICERS.

Men Named to Head MotoKart Company, Which Takes Over Two Older Concerns.

As announced recently, the MotoKart Company has been incorporated under the laws of New Jersey to take over the business heretofore conducted by the Tarrytown Motor Car Company, maker of the MotoKart light delivery wagon, and the Steinbock Engineering Company, which supplied the parts for this machine. The offices of the company will be retained at 1790 Broadway, New York City, and the factories at Tarrytown and Peekskill, N. Y., have been transferred to the new concern. As a result of the consolidation, new officers are announced as follows:



A. R. Gormully, President, MotoKart Company.

President, A. R. Gormully; vice president, H. E. Steinbock; sales vice president, G. C. Wolfe; treasurer, B. J. Knerr; secretary, E. M. More; purchasing agent, F. C. Sievers.

President Gormully is well known in the industry. He was born and educated in London, England, and came to Boston in May, 1892. He began active business life with the Gormully & Jeffery Manufacturing Company, Chicago, as an office boy, and arose to become manager of the export department before leaving this concern in 1900. The next two years were spent with the Electric Vehicle Company in its first plant in New York City, as superintendent's assistant. From 1902 to 1904 he was assistant manager of the Erie Basin Works, maker of general machinery, and in 1905 he went with the Vehicle Equipment Company, Long Island City, as purchasing agent. After that he was for four years purchasing agent for the Maxwell-Briscoe Motor Company, Tarrytown, N. Y., and upon the formation of the United States Motor Company he held the position of general purchasing agent

until he resigned in December, 1912, to become treasurer of the Steinbock company.

JOINS OAKLAND FORCE.

Fred W. Warner Becomes General Sales Manager, Vice J. B. Eccleston, Resigned.

Announcement is made by the Oakland Motor Car Company, Pontiac, Mich., of the appointment of Fred W. Warner as general sales manager, succeeding J. B. Eccleston, who has resigned. Mr. Warner was originally connected with the wholesale implement business, but for the past three years has been manager of the Buick Motor Company's Chicago branch.

In 1890 he joined the selling force of the John Deere Plow Company at Kansas City, as travelling salesman, and was with that concern for 14 years in various positions, being sales manager during the last four years, in Colorado, Oklahoma, New Mexico and Arizona. When he left that company in 1904 he opened and managed most successfully a branch house at Dallas, Tex., for the Racine-Sattley Company. Six years ago he became associated with the Keating Implement & Machine Company, the oldest house of its line in the Southwest, as secretary and sales manager.

ON HIS WEDDING TRIP.

A. H. Bartsch Also Found Time to Establish a Score of Bosch Service Stations.

It appears, according to information from New York City, that Alfred H. Bartsch, advertising manager for the Bosch Magneto Company, was married Feb. 10, leaving that night with his bride for Los Angeles, Cal., to witness the Vanderbilt Cup and Grand Prize races. On the way he stopped at the Grand Canon in Arizona, and was somewhat disappointed to find that only horses and burros were used in that vicinity, so that he was unable to establish a Bosch service station.

However, he joined Chief Engineer V. W. Kleisrath in Los Angeles and together they saw to it that those interested had the usual good Bosch service. On the return trip, Mr. Bartsch visited the western distributors, stopping off in San Francisco, Sacramento, Salt Lake City, Denver and Chicago. While in San Francisco he arranged the details for the Bosch exhibit at the Panama-Pacific exposition in 1915. He also established over 20 new Bosch service stations west of Chicago.

TAKES OVER VULCAN GEARSHIFT.**Cutler-Hammer Manufacturing Company Will Continue Its Production in Milwaukee.**

Announcement is made by the Cutler-Hammer Company, Milwaukee, Wis., well known as the maker of electric controlling devices, with branches in New York, Boston, Philadelphia, Pittsburg, Cleveland, Cincinnati, Chicago and San Francisco, that it has taken over the production and marketing of the Vulcan electric gearshift. This has been made heretofore by the Vulcan Motor Devices Company, Philadelphia, and is standard equipment on the Haynes, Pullman and other cars for 1914.

Roger W. Griswold, president of the Vulcan Motor Devices Company, and W. A. McCarrell, chief engineer, will continue to be actively interested in the manufacture of the product. A new department of the Cutler-Hammer Company, to be known as the Vulcan electric gearshift department, has been created to handle this business, with headquarters in Milwaukee.

REJOINS MERCER FORCES.**Designer of Deltal Special Racing Car Becomes Company's Chief Engineer.**

E. H. Delling has been appointed chief engineer and designer of the Mercer Automobile Company, Trenton, N. J., maker of the Mercer line, succeeding Finley R. Porter, resigned. He is not exactly a new man in the Mercer ranks, since he was connected with the concern in the capacity of assistant engineer about two years ago.

Mr. Delling is well versed in European engineering practise, and his ability as a designer of high speed, high efficiency motors is somewhat well known in the industry. He built the Deltal car, a special racing machine, which finished in second place in the contest for the Chicago Automobile Club's trophy at Elgin, Ill., last August. He also had a share in designing the Mercer car which made such a wonderful showing in the 1912 and 1913 500-mile races on the Indianapolis motor speedway.

In connection with the resignation of Mr. Porter, it is stated that he has secured temporary offices at 1790 Broadway, New York City, until complete arrangements for factory location and organization can be made, at which time he expects to announce an entirely new car, to be produced in two four-cylinder models. Mr. Por-

ter went with the Mercer company as chief engineer four years ago and one year later became factory manager as well. His experience in the industry should place him in an exceptional position to undertake the production of a car of his own.

WATERMAN SUCCEEDS REEVES.**Resumes Active Connection with Hartford Suspension Company After Year's Lapse.**

It will prove of interest to the many friends of Arthur Waterman, both in and out of the industry, to learn that he has returned to the Hartford Suspension Company, Jersey City, N. J., as vice president and general manager, succeeding Alfred Reeves, who resigned to become general manager of the National Automobile Chamber of Commerce. Mr. Waterman was formerly sales and advertising manager of this company, until shortly before the New York show of 1913, at which time Mr. Reeves became identified therewith.



Arthur Waterman, Vice President, Hartford Suspension Company.

In the interim, Mr. Waterman has been connected with the G. C. Vaporizer Company of America, New York City, as sales manager. He is well acquainted with the products of the Hartford Suspension Company and is thoroughly conversant with the methods employed in marketing them.

TO REVIVE AMPLEX CARS.**Company Organized to Produce Machines Equipped with Sleeve Valve Motor.**

According to information from Mishawaka, Ind., operation of the plant of the Amplex Motor Car Company will be continued by a new con-

cern, recently organized by Chicago men, under the name of the Amplex Manufacturing Company, with capital of \$500,000. These men include W. R. Randall, H. M. Pulcifer, W. Mackerstaff and H. Paulin.

It is understood that it is the plan of the new concern to produce a six-cylinder car, equipped with a new type of sleeve valve motor, designed by E. J. Gulick.

NOW GENERAL SALES MANAGER.

R. J. Schmunk Succeeds to This Title After Seven Years with Peerless Company.

Announcement is made by the Peerless Motor Car Company, Cleveland, O., maker of Peerless



R. J. Schmunk, General Sales Manager, Peerless Motor Car Company.

cars and trucks, that R. J. Schmunk, who joined the selling force of that concern about seven years ago, has been made general sales manager, the chief executive of the selling division. Shortly after his connection with the company he was made sales manager, and a year ago his title was changed to director of sales,

with largely increased duties and responsibilities. This latest appointment places upon him the entire management of the marketing of the Peerless product.

Mr. Schmunk has been connected with the motor car industry from its very inception, and knows its history in all its ramifications. He has served in a wide variety of capacities with several well known companies, and in different parts of the United States. He has made the acquaintance of thousands of dealers from the Atlantic to the Pacific, and from Canada to Mexico, all of whom will be glad to congratulate him upon assuming his new responsibilities.

Another promotion in the Peerless ranks announced recently is that which resulted from the

election of T. C. Frech as director, in place of F. S. Terry, and vice president, succeeding J. B. Crouse. He also becomes general manager of the company.

STUDEBAKER'S ANNUAL REPORT.

Gross Business of \$41,464,949.82 and Net Profits of \$1,772,473.65.

The annual report of the Studebaker Corporation, Detroit, shows a gross business for the calendar year of \$41,464,949.82, as compared with \$35,440,327.41 during the previous year. This is an increase of 17 per cent., and is the largest volume of business in the history of the company. The net profits from all sources, after payment of interest, etc., were \$1,772,473.65.

Concentration on two models, a four and a six, during the latter part of the year proved a stimulus to trade, and prospects for 1914 are indicated in the figures for January and February, 1914, which show the following: Cars produced, 5703 in 1914, as against 2581 in 1913, a gain of 121 per cent.; cars sold for cash, 5720 in 1914 as against 3019 in 1913, a gain of 89 per cent.; cash receipts, \$4,827,812.95 in 1914, as against \$3,385,948.94 in 1913, a gain of 43 per cent.

SINGER'S NEW CAR.

Temporary Headquarters in New York City and Factory on Long Island.

Supplementing the information made public coincident with the recent appointment of a receiver for the Palmer & Singer Manufacturing Company, incorporation papers for Singer Motor Company have been filed at Albany, N. Y. The authorized capital is \$200,000 and the incorporators are: Charles A. Singer, formerly president of the Palmer & Singer Manufacturing Company; C. A. Singer, Jr., and Harold Callisen. Temporary headquarters have been established at room 707, Longacre building, New York City, and a factory has been secured on Long Island.

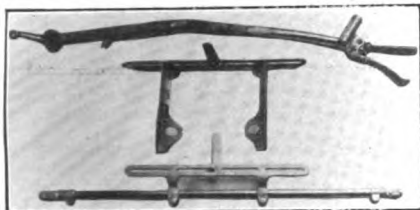
A. M. Dean, formerly consulting engineer for the Palmer & Singer Manufacturing Company, and the Matheson Automobile Company, has been retained in a similar capacity with the new concern. It is understood that the new car will be a six-cylinder machine, constructed along the same lines as the Palmer-Singer. It is stated this new car will utilize a T head poppet valve motor, with four-inch bore and stroke of 5.5.

NEW ACCESSORIES FOR THE MOTORIST.

A. A. A. SPECIALTIES.

Include Headlight Rod, License Plate Holder and Brake Handle.

The A. Auto Appliance Company, 114 West Exchange street, Providence, R. I., is manufacturing three



new specialties for the model T Ford car. The one shown in the upper part of the illustration is an emergency brake pawl release handle, which is held to eliminate all vibration and noise and to improve the operation of the lever. The handle is one inch longer than the conventional member and is designed to fit the palm of the hand. It is made of high grade malleable iron and the release pawl is fitted with a heavy piano wire coil spring.

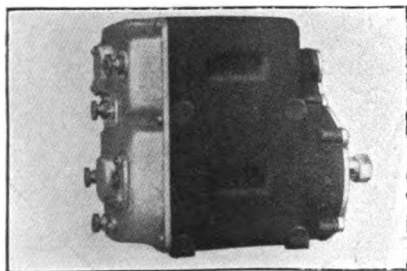
The device shown at the bottom of the illustration is an adjustable headlight rod, which prevents rattling of the lamps, and is also provided with a license number plate bracket. The holder is made of heavy brass tubing with bronze ends. The centre illustration depicts the A. A. A. number plate bracket.

FISHER MOTOR-GENERATOR.

Lighting and Motor Starting System for Model T Ford Cars.

The Fisher Electrical Works, 1690 Larned street, West, Detroit, maker of electric lighting and motor starting systems, is manufacturing an equipment designed for service with the model T Ford automobile. It is a unit system, a motor-generator, and one of the qualities of the design is that it may be installed without machine work or drilling. It is a 12-volt, three-wire system, and six-volt lamps are employed.

The complete equipment comprises a silent chain, two sprockets, pulley for fan belt, zero line ammeter, starting and lighting switch, cables, adjustable supporting bracket, 12-volt 35 ampere-hour capacity storage battery and the motor-generator.



The unit is mounted on the left hand side of the motor, a special bracket being bolted to the power plant. Drive is by chain, a sprocket being fitted to the crankshaft. When current is led to the unit from the battery, it functions as a motor, rotating the crankshaft by means of the silent chain. Upon the motor starting, the current being cut out from the battery, the unit functions as a dynamo, charging the cells.

STANDARD AUTO-THERMO.

Indicates Temperature of Motor by That of Cooling Fluid.

The Standard Thermometer Company, 65 Shirley street, Boston, is marketing the Standard auto-thermo, which is a neat, compact device fitted to the radiator cap and is adapted for attachment to either the hinged or screw cap. It is fitted by boring a hole in the cap, inserting the extension and tightening a nut on the last named member. The part extending



into the radiator actuates a hand which moves over a calibrated dial, the degree and direction of movement being influenced by the temperature of the fluid of the cooler, or, in other words, the motor.

The hand moves across transparent zones, and temperatures equalling that of freezing, maximum motor efficiency and steaming are shown. When the hand is in a vertical position, it indicates "Safe"; that is, the cooling water is at a temperature when the motor is operating at its maximum efficiency insofar as temperature is concerned. The Standard auto-thermo is finished in nickel, brass or black enamel and is moderately priced.

Ed. Note.—The editor of this department wishes to acknowledge the receipt of a number of new accessories from manufacturers. Some of these are presented in this issue, while others were received too late for publication, but will be described and illustrated in the April 10 issue of The Automobile Journal. Several descriptions of devices have been received without illustrations, which should be forwarded to insure their publication.

UNIVERSAL TAIL LIGHT.

Electric Lamp, Solderless and Made in Two Styles.

The Combination Tail Light Company, 954 Tremont street, Boston, is manufacturing an attractive, compact



electric tail light termed the Universal. It is fitted with an ingenious device which throws a soft, strong light over the entire surface of the number plate, and the maker lays emphasis on this point, stating that glaring is eliminated, and that the illumination conforms with the laws. The lighting device is attachable or detachable instantly, overcoming troubles in replacing a damaged bulb with a new one. Any bulb with an Edison base and not more than 1.25 inches in diameter may be used.

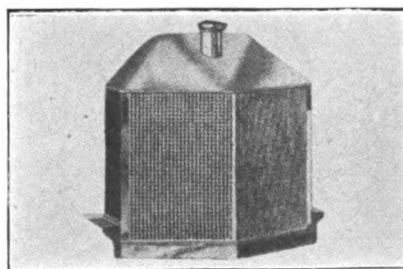
One of the features of the design is the use of a combination socket, which will fit the bracket of any car. Soldering has been eliminated in the Universal, all parts being electrically welded, making for durability. It is made in two styles, C, having a steel back, nickel and enamel top and finished in nickel and black outside.

AUTO PARTS RADIATOR.

V Shaped Honeycomb Design for Model T Ford Cars.

The Auto Parts Company, Chicago, is marketing a special design of radiator for the model T Ford automobile. It is of the V shaped design, and is stated to be a genuine honeycomb type. It is constructed to replace the regular cooler and without any alteration or special fittings. It is made with two finishes, nickel plate and brass, the latter listing \$2 less.

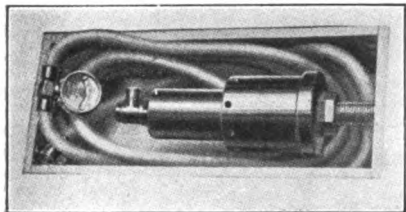
The company is also marketing the P. G. N. headlight, which provides three lighting equipments in one. The upper section of the lamp forms the usual acetylene headlight and the lower an electric unit. Between them, at the right and left, are two small electric bulbs for city driving.



GEMCO SPARK PLUG PUMP.

Constructed Especially for the Model T Ford.

The Garage Equipment Manufacturing Company, Milwaukee, Wis., has brought out a special power



pump for the model T Ford car, and those of similar size, termed the Gemco. It is screwed into the spark plug opening in the cylinder and is actuated by the compression of the motor. The cylinder of the pump is provided with a piston and rings, and these are machined and fitted carefully to insure maximum efficiency.

The principle of the pump is that of an air compressor and it is stated that only pure, fresh air is pumped to the tires. The pump comes packed in a neat box with 12 feet of rubber hose, necessary connections and adapters for attaching to any motor. A gauge for indicating the pressure is listed at slightly extra. The Gemco is finished in what is termed hard rubber black enamel.

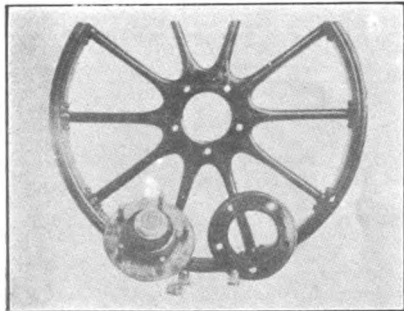
CROWN PRINCE WHEELS.

Demountable Design Constructed of Pressed Steel.

The use of pressed steel in motor car construction is becoming more general and a new application of the material, at least in this country, is noted in the Crown Prince pressed steel wheels, which are being marketed by Max Bacham, 845 Jefferson avenue, East, Detroit.

It is held that they are 200 per cent. stronger than wooden members, lighter, and considerably more durable. It is also claimed that much more tire mileage is obtained and that greater speed is possible. One of the qualities of the design emphasized is that it will not collapse; merely bend when subjected to severe stresses which would break wooden constructions. Being of metal the Crown Prince design cannot shrink or the spokes become loose.

The Crown Prince is a demount-



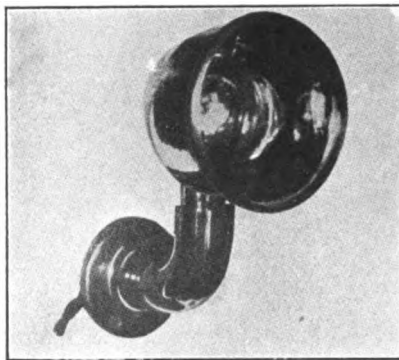
able wheel, and it is stated that it may be removed and an extra member is fitted in about one minute. It is retained by five nuts, which are displaced by a brace type of wrench. The wheels are equipped with either clincher or quick detachable rims and it is stated that they weigh only a few pounds more than the average demountable rim.

PASCO ELECTRIC SIDE LIGHT.

Design Adapted to All Types of Cars and of Special Material.

The Portland Auto Specialty Company, 604 Fidelity building, Portland, Me., is marketing the Pasco electric side lamp, which is a very neat and compact design, intended for cars not equipped with electric lighting, although it is serviceable with any machine. It is designed to provide a large amount of light, a well designed parabolic reflector being employed.

The bulb is placed in a vertical position, a location making for maximum illumination. One of the qualities of the design is that the wiring is concealed, it being carried through the bracket, thence to the



switch on the dash, etc. The lamps are constructed of a special combination silver metal, with polished nickel finished interiors and silver, brass or black enamel outside. They are moderately priced and the complete equipment includes two lamps, bulbs, wire and switch.

DEMOUNTABLE RIMS.

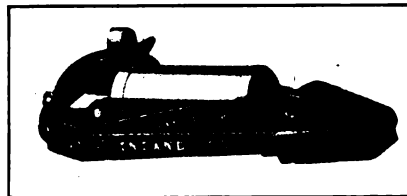
The convenience of demountable rims is appreciated by motorists and their popularity has led several manufacturers to make a specialty of designs for the machine not equipped with these members. It is now possible for the owner of a car equipped with clincher rims to fit the demountable form at a reasonable cost.

A popular priced car that is being given attention by the rim maker is the model T Ford, and several types of quick detachable or demountable rims are being offered at a reasonable cost. Usually the equipment provides for utilizing the same size tires all around, although an exception is noted in one make, which makes possible the use of shoes with which the car comes equipped.

INLAND HAND PUMP.

Compact Design for Attachment to the Running Board.

The Inland hand pump is manufactured by the Inland Manufacturing Company, Chicago, and one of the



features of the design is its compactness. It is but 15 inches when folded; is designed to be attached to the running board by a wing nut arrangement, and is operated by a lever, which also folds.

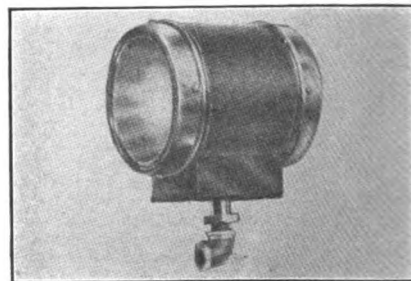
The cylinder and base are constructed of brass, the former having a bore of three inches and a stroke of 5.625. The piston is of cold rolled metal and is equipped with a leather packing. One of the qualities of the design emphasized is that it will not heat in service, a draught of air flowing through the cylinder at each compression stroke, it is stated. The pump comes complete with eight feet of high grade hose and a pressure gauge.

AUTO FENDER SAFETY LAMP.

Shows a Double Green Light, Indicating Car's Position.

The Auto Fender Safety Lamp Company, Inc., Corinth, N. Y., is manufacturing the Auto fender safety lamp, the utilization of which differs from conventional practise in motor car lighting. The lamp, which is an electrical unit, is placed on the left front fender, throws a double light, showing green to the front and rear, distinctly outlining the fender. This shows the position of the car to the driver approaching in the opposite direction.

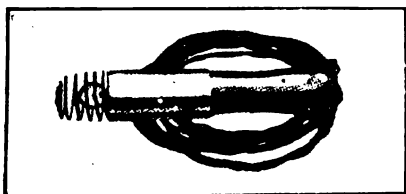
The maker points out that the Auto fender safety lamp makes for safety in that it will show the driver of another car the position of the machine fitted with the device, and that the light may be distinguished easily for a considerable distance. One of the qualities of the light is that it has no glaring or dazzling effects even at close range. It is moderately priced; consumes but little current, and may be connected with the regular lighting system.



MABEY COMBINATION LAMP.

Comprises Searchlight and Inspection Features.

Mabey's Electric & Manufacturing Company, 940 North Pennsylvania street, Indianapolis, maker of elec-



trical specialties, is introducing a combination trouble and spot light, as it is called, which presents practical features. The device is shown ready for service as a trouble lamp in the accompanying illustration.

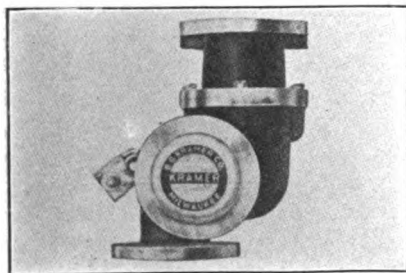
It is a very compact unit, and, as will be noted, is shaped similar to a cigar. The bulb is protected from damage, when using the lamp as an inspection member, by a wire cage, and when not in service is prevented from being broken by a telescopic joint. The last named member provides the spot light feature referred to, and the maker states that a brilliant light is obtained. The device is finished in nickel and has a hard wood handle, 10 feet of cord, Edison socket and an attachment plug.

KRAMER GOVERNOR.

Automatically Controls Speed of the Gasoline Motor.

The B. G. Kramer Company, Milwaukee, Wis., is manufacturing the Kramer governor, which is especially for commercial vehicles, where it is desired to limit their speed to a predetermined number of miles an hour. The device is also applicable to pleasure cars. The instrument is designed to control and maintain a constant speed of an internal combustion engine by governing the velocity of the incoming gases.

It comprises a throttle, connected to a disc member, that is allowed to float under a constant spring tension in a tapered conduit, the tension of the spring determining the maximum motor speed. Upon the velocity of the incoming gases changing, due to variation in engine speed, the position of the disc in the conduit is affected. This results in altering the position of the throttle, allowing more or less mixture, as the case may be, to be fed to the cylinders, and as



the condition may require.

An auxiliary control lever is provided, permitting the driver to obtain any variation of speed up to the maximum afforded by the governor. It is pointed out that not only does the device make for efficiency and economy of fuel, but it cannot be tampered with.

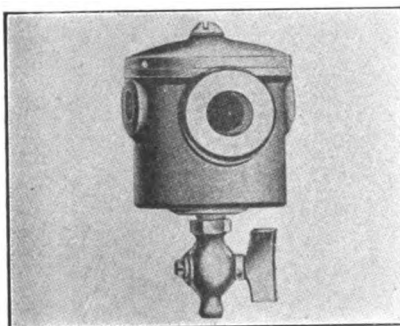
R. O. C. SUPERHEATER.

Raises Temperature of Fuel Before It Reaches Carburetor.

The National Economic Supply Company, 1777 Broadway, New York City, is marketing the R. O. C. Superheater, a device designed to raise the temperature of the fuel before it reaches the carburetor, and consequently, while it is in a liquid state. It is sprayed into the mixing chamber of the carburetor in the conventional manner but, as the gasoline is heated, it is obvious that it vaporizes readily.

The heat of the exhaust gases is utilized to raise the temperature of the fuel, the Superheater being connected in a branch line of the exhaust. The device is installed in the fuel line, consequently all gasoline passes through it before reaching the carburetor.

The advantages claimed for the



Superheater are: Rapid vaporization of the fuel, a more homogeneous mixture in that precipitation is prevented, economy and less carbon. It is pointed out by the maker that low grades of motor fuel may be successfully used without carbonization. The R. O. C. Superheater is very compact, constructed of high grade material and is moderately priced.

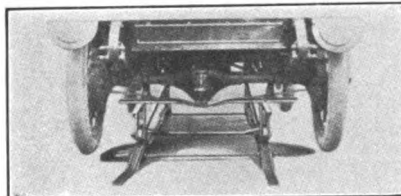
LOCKING THE CAR.

It would appear that automobile thieves are growing bolder, judging from the large number of cars reported stolen. This has been responsible for a number of locking devices, which are designed to prevent use of the machine by others than intended. The more inexpensive types lock the car's mechanism so that it cannot be moved, which is a disadvantage where the machine is stored in a public garage. The more practical design is that which prevents the operation of the motor or use of gearset or clutch and allows the vehicle to be moved by hand, as to the washstand for example.

CADY AUTO-JACK.

Automatically Raises and Lowers the Automobile.

The Cady Auto Appliance Company, 755 Central avenue, Cleveland, O., is manufacturing the Cady Auto-Jack,



which is stated to be automatic in its action. It lifts all four wheels of the machine 1.5 inches clear of the floor without effort upon the part of the owner of the machine other than driving the car upon it. A small lever, easily operated, permits of removing the car from the jack when desired, and the maker states that a child can do the work.

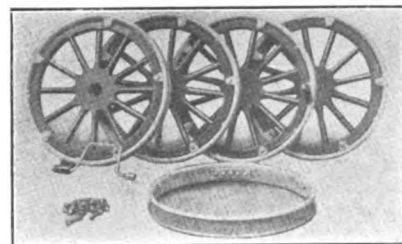
The Cady Auto-Jack is constructed of steel and finished in aluminum. It is guaranteed against any defect in workmanship or material, and weighs, crated for shipment, 200 pounds. It is moderately priced and the maker points out that it will not only save its cost in tire economy, but it will be found to be decidedly useful in the maintenance of the machine.

BAKER DEMOUNTABLE RIMS.

Designed Especially for Ford Cars and Come Painted.

The City Auto Tire & Supply Company, 1200 Huron road, Cleveland, O., is marketing Baker demountable rims for the model T Ford car, and the design of these members is such that they may be applied readily. The equipment is shown in the accompanying illustration and comprises four wheels with rims attached and one extra rim. The new wheels are nicely painted, striped and varnished, and the usual brace wrench and 24 new hub bolts are included.

To attach the wheels the nuts and bolts of the old members are removed and the hubs driven out. The hubs are then inserted in the Baker wheels; the new hub bolts fitted and the nuts put on and tightened. The rims utilize 30 by 3.5-inch tires, the maker pointing out that this arrangement makes for convenience as well as tire economy. The wheels are hickory and the rims are made by the Universal Rim Company.



ECONOMIZING TIME IN LOADING TRUCKS.

Novel Use of Overhead System, Combined with Specially Designed Body Equipment, Minimizing Labor and Delay, by California Wholesale Grocery House.

ECONOMY is a relative term. Business men who have given careful consideration to the subject of motor transportation are readily convinced that economy and efficiency are very closely related. In other words, there are certain lines, at least, in which it is possible to effect a saving over horse drawn equipment only when the motor truck can be utilized to its fullest capacity, particularly with reference to time. This applies to practically all lines, when it becomes a matter of the greatest economy.

Within the past few years wholesale grocers have given unusual attention to the question of

ever, it is extremely essential that the truck shall be kept busy, and to this end many interesting plans have been devised. One of these is indicated by the accompanying illustrations.

The system is that employed by M. A. Newmark & Co., Los Angeles, Cal., and by its use it is stated that the company saves at least 45 minutes in loading each vehicle. In addition, the handling of packages is still further reduced, requiring the services of a lesser number of men for a given amount of work, and eliminating the danger of making mistakes, since it is possible to make up orders and check them ahead of time

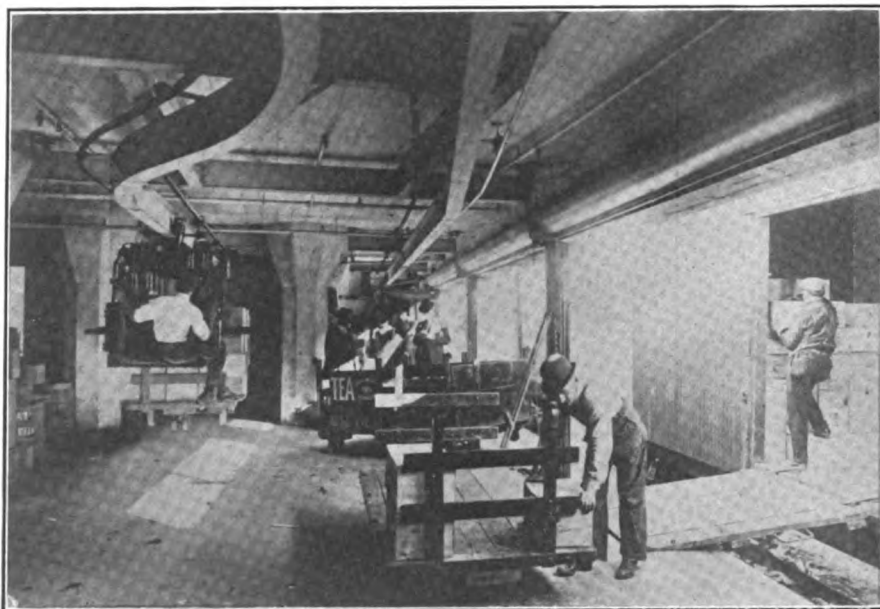
without confusion and hurry at the last moment.

In the first place, this company designed removable truck bodies, these virtually being hand trucks mounted on wheels of their own. Two of these are assigned to each chassis, a dummy wooden frame being fitted to the chassis frame as indicated in the foreground of one of the illustrations. These are lifted into and out of position by means of a telfer as shown. The other photograph reproduced herewith presents the overhead conveyor system, which is installed through the building, including the different elevators, so that the small trucks can be placed in position wherever wanted.

position wherever wanted.

In practise the small trucks are loaded while the motor trucks are on a delivery trip, and as fast as the orders are received, by mail or over wire. When the motor truck returns the telfer picks up the empties and replaces them with filled receptacles in waiting, and there is almost no delay.

As will be noted by the accompanying illustrations, the telfer equipment includes an electric motor, with provision at the rear for the operator, who occupies a convenient seat and directs the placing of the hand trucks. Suitable



Indicating the Overhead System Employed to Place Hand Trucks in Various Parts of Newmark Wholesale House.

highway haulage. In many instances their travelling salesmen have been supplied with automobiles, the better to cover their territory and reach customers without depending upon railroad schedules. Possibly it was the success which attended this innovation which caused the heads of such firms to investigate the possibilities of motor trucks.

The advantages of motor equipment in this field are many, including the ability to make quick deliveries at the door of the customer, and the elimination of freight charges and the necessary additional handling of the packages. How-

belts, running over pulleys are arranged to pick up the trucks and hold them suspended while the electric motor conveys them about the warehouse. Several of these telfers are employed to accommodate the needs of the company.

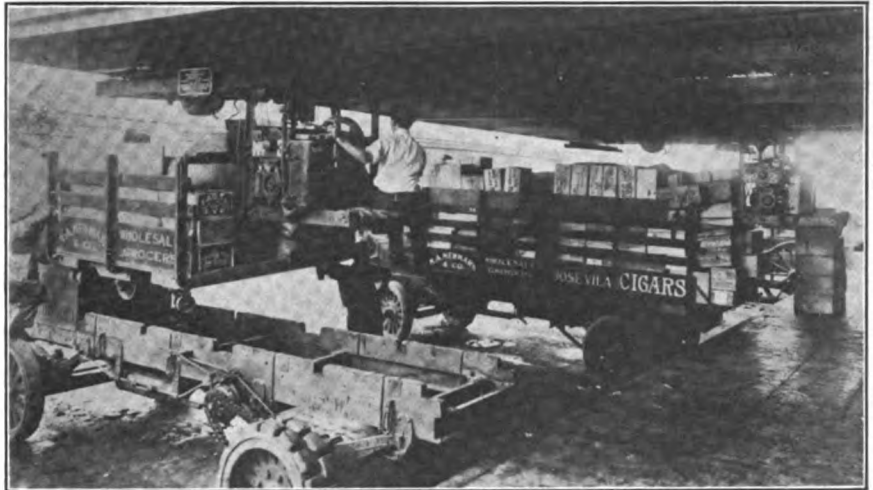
The Newmark house is not only one of the first concerns on the Pacific Coast to use motor trucks in its business, but it is one of the largest users of such vehicles in Los Angeles. As soon as it had been demonstrated to the satisfaction of its officials that mechanical transport offered a means for increasing the range of action, practically all of its horse drawn wagons were replaced by automobile equipment.

For more than a year now it has been operating a fleet of 11 GMC trucks of 3.5 and five tons capacity. The overhead conveyor system described above was installed soon after the decision to utilize such vehicles was made, and this plan has played a very important part in the success of the enterprise. According to the officials of the company it has increased the efficiency of the trucks at least 30 per cent.

EMPIRES IN DISTANT LANDS.

Indianapolis Product to Be Displayed in Australia and the Orient.

During the New York show in January, arrangements were made to ship the entire exhibit of Empire cars, made by the Empire Automobile Company, Indianapolis, Ind., to Sydney, Australia, where it will be on display at the mo-

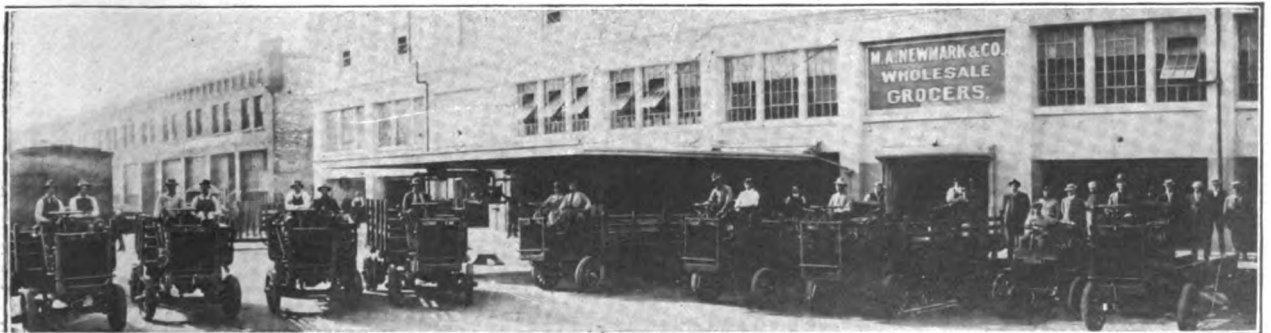


Telfer Loading Hand Trucks on Specially Designed Commercial Car Chassis in Service of M. A. Newmark & Co., Los Angeles, Cal.

tor vehicle exhibition to be held in the near future. Another Far East show, at which Empire cars will be represented, is that to be held in Semarang, Java, next month.

The exhibition of the Empire Little Aristocrat, as the product of the company has come to be known, in these foreign displays, is an indication of the worldwide business which this company has secured. During a recent six weeks' period shipments of Empire cars were made to England, Scotland, Ireland, Wales, France, Portugal, Sweden, Denmark, Norway, Finland, Australia, Tasmania, New Zealand, Philippines, three cities in India, Malay Peninsula, Java, Japan, Arabia, South Africa, Argentina and Chile.

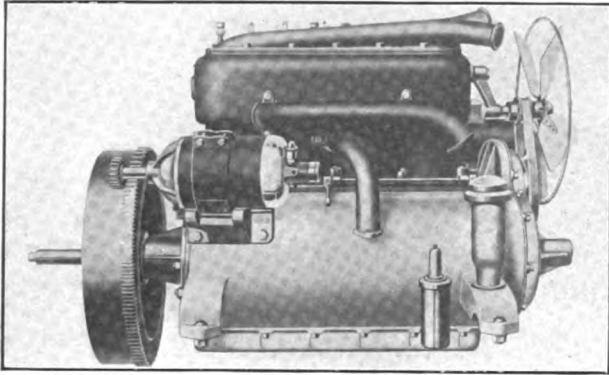
G. E. Warner, New Berlin, N. Y., who recently opened a garage, accessory and repair business under the name of the New Berlin Motor Supply Company, has been instrumental in the organization of the New Berlin Automobile Club, with 20 charter members. F. E. Holmes is president and J. T. Ball, secretary.



Fleet of 11 GMC Trucks Used by M. A. Newmark & Co., with Overhead Conveyor System Described.

REGAL LINE INCLUDES FOUR MODELS.

THE Regal line of motor cars for the 1914 season comprises four models, three of these being of the well known underslung type and



Right Side of Regal Model T Motor Showing Location of Rushmore Starter and Method of Meshing Pinion with Periphery of Ring Gear Flywheel.

the fourth chassis being termed an overhung by the maker, the Regal Motor Car Company of Detroit. The last named, the model C, differs from the conventional spring suspension in that the four springs are suspended from the undersides of the axle, which not only lowers the frame, but provides a straight line drive, as well as makes for a factor of safety when travelling at high speeds.

The chassis of this model is fitted with attractive streamline type of five-passenger body, and the upholstery and appointments are in keeping with the rich design. The equipment is most complete and includes a Rushmore motor starter and lighting dynamo, two separate units. Electric lighting and motor starting are standard equipment on all Regal models.

The L head motor is larger than that used in the other chassis, having a bore of four inches and stroke of five, and the cylinders are cast en bloc with the intake passage cored out between the second and third cylinders. It is rated at 35 horsepower. The exhaust is cared for by a detachable manifold.

A three-bearing crank and camshaft are utilized, the bearings being of liberal size and supported in the conventional manner. The crankcase is divided, the upper half being reinforced to give rigidity, and the

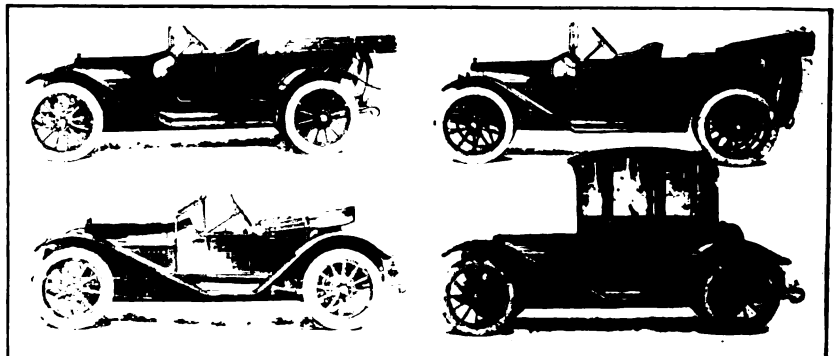
lower half being easily displaced. The motor is suspended on the main chassis frame by four arms cast integral with the engine base. A constant level splash system of lubrication is employed, a plunger pump driven by an eccentric on the camshaft forcing the lubricant to the bearings, and the connecting rods dipping into it about .125 inch.

The ignition system is dual, batteries and a magneto, and cooling is by thermo-syphon with fan. The clutch is a cone, leather faced, and the gearset located on the rear axle is of the selective type providing the usual three forward speeds and reverse. Left hand drive and centre control are standard with all Regal models.

Two universal joints are employed, one in the housing attached to the forward end of the transmission case and the other just back of the clutch sleeve. The housing of the drive shaft serves a double purpose, in that it encloses the driving member and functions as a torque tube. Heavy radius rods extend from the rear axle housing to upright brackets riveted to the centre cross member of the frame. The last named member is made of tested, rigidly inspected pressed steel channels of the conventional type, and has a kickup at the rear. The front axle is of the I beam section type, and the rear semi-floating. High duty roller bearings are utilized and the axles are nickel steel.

The service brakes are of the external contracting type, operated by pedal, the expanding emergency being actuated by the usual hand lever. Both sets are liberal in size and are adjustable. The steering gear is of the irreversible worm and gear type and means are provided for taking up lost motion.

The Regal Motor Car Company calls particu-



The Regal Line Comprises Two Five-Passenger Touring Cars, a Two-Passenger Roadster and a Coupe—The Regal Underslung Spring Suspension Is Featured, with the Exception of Model C, Which Utilizes Overhung Springs.

lar attention to the springs and the method of suspension. The front springs are semi-elliptic, 38 inches long and two wide, while the rear are three-quarter elliptic, 46 inches long. These dimensions, coupled with a wheelbase of 116 inches, not only make for maximum comfort when traversing rough roads, but for durability.

The tire size is 34 by four inches and demountable rims with one extra members are standard equipment. Provision is made for carrying spares at the rear of the chassis.

The Rushmore motor starter has been described in these columns. It is operated by a button located on the dashboard, convenient to the driver. The lighting system eliminates the side lamps, a dimming attachment being provided in the headlights and controlled from the seat. All trimmings are nickel, and the equipment comprises an electric horn, mohair top, special curtains, top boot, rain vision ventilating windshield, speedometer, muffler cut out, tire irons, tools, etc. The standard color is dark blue with light blue striping.

The underslung models comprise the N, a two-passenger roadster; the NC, a three-passenger coupe, and the T, a five-passenger touring car. With the exception of the tire equipment, the coupe being equipped with 33 by four-inch tires, and the others with 32 by 3.5, the chassis details are similar. The motor is of the L head, en bloc type, with a bore of 3.75 inches and stroke of 4.5.

The roadster was designed to meet the demand for a compact, comfortable, roomy fast car, one adapted for business as well as pleasure. Its lines are long and sweeping, and the low suspension, due to the Regal underslung springs, provides a large factor of safety when travelling at high speeds. This has always been one of the qualities of the Regal chassis emphasized. Many details have been refined. The fuel tank at the rear is partly enclosed, and as with the model C the side lamps have been eliminated.

The coupe is patterned after the latest vogues in coach work; is exceptionally large, and seats comfortably two persons on the rear seat, provision being made for an extra passenger by a front folding seat. The body is low hung, following Regal practise, and large single plate windows are utilized. All the main windows and glass front are adjustable, affording suitable ventilation for all seasons of the year. The seat and lower part of the body are finished in buffed leather, the upper part and ceiling being in blue broadcloth. The appointments are in keeping with the rich design.

The model T is a five-passenger touring car

providing room for five large persons. There is ample space between the front and rear seat, and the upholstery is deep and comfortable. All of the underslung models have an equipment that leaves nothing to be desired.

NEW JERSEY CYCLECAR CLUB.

Will Hold Its First Run from Newark to Dr. Percival's Farm on Memorial Day.

The formation of cyclecar clubs is quite the order of the day. During the recent Boston automobile show, Dr. Charles G. Percival, the well known automobile publicity man, helped form the Cyclecar Club of New England. Immediately upon his return to New Jersey, which is now his home state, he found the representatives of 10 makes of cyclecars ready to organize the Cyclecar Club of New Jersey.

A meeting of those interested was held in Newark, St. Patrick's Day, and the following officers were chosen:

**Dr. Charles G. Percival, President,
Cyclecar Club of New Jersey.**

Charles G. Percival, Teaneck; first vice president, William Bouldin, 3rd., East Orange; second vice president, H. Coulson Fairchild, Montclair; secretary, C. T. Chatfield, Newark; treasurer, Chauncey Batzle, Bloomfield; board of governors, G. A. McLaren, Newark; H. M. Condict, East Orange; T. H. Blackmore, Allendale; Harvel Batzle, Bloomfield. The club voted to engage permanent quarters at 223 Halsey street, Newark. It was decided to hold the first club run from Newark to President Percival's farm at Teaneck, Memorial Day.

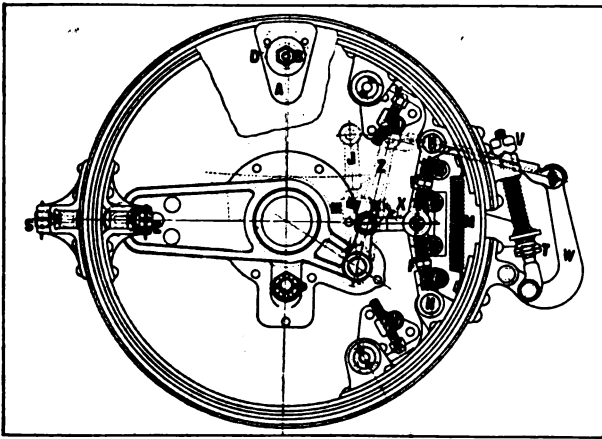


SUGGESTIONS FOR THE NEW CAR OWNER.

Adjusting Service and Emergency Brakes on Cadillac Car--Simple Method of Constructing Fuel Measure--Adjustment of Clutch on Model 31 Empire.

THE general practise is to fit two sets of brakes to the car and to utilize the external contracting type for the service members and the internal expanding for the emergency, as with the Cadillac car, for example. Next to the steering gear the brakes are important factors in the operation of the machine and should be inspected from time to time; adjustments made and the friction material renewed if worn down to the rivets.

While either set should be capable of locking the wheels, it is bad practise to so use them, and they should only be employed thus in a case of emergency. The experienced operator will utilize the throttle and use judgment in its ap-



Components Utilized in Adjusting for Wear of Service and Emergency Brakes on Cadillac.

plication when about to slow down for a stop, for example.

Sometimes the brake lining will become dry after continued service, gripping the drums too quickly. A mixture of graphite and oil smeared over the friction material will generally cure the trouble, but it should be used sparingly. If applied properly it will not interfere with the efficiency of the brakes.

That the operating mechanism of brakes will require lubrication from time to time will be made evident by a study of an accompanying drawing which shows the components of the Cadillac external contracting and internal expanding brakes. It will be noted that the service members (external) comprise bands that are contracted by a lever W, which, when moved

forward, draws down the upper half of the band and moves upward the lower half, by means of the screw member T V.

Adjustment of the service brakes is made by turning the screw S until that part of the band opposite it is brought as close as possible to the brake drum without touching it. Next adjust the nuts T on the eye bolt until the lower half of the band lining just clears the drum. The nut V on the upper end of the eye bolt is so adjusted as to bring the lever W to the position shown in the drawing when the brake is applied. With the brake released the clearance between the lining and drum should not be over approximately .03125 inch, and if more exists, it may be reduced by the set screw X in the rocker lever Z.

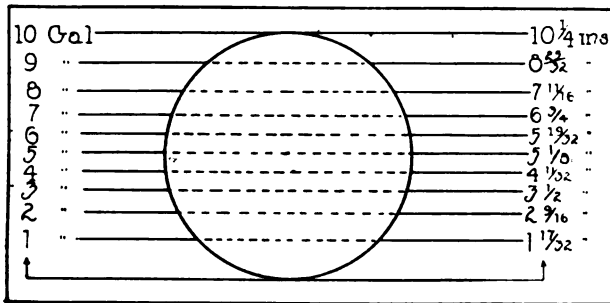
The internal brake is constructed to be adjusted for clearance between the internal band and the drum, without displacing the wheels. Jack up the axle so that the wheel will clear the ground, permitting of revolving it by hand, and remove the cover A from the opening in the brake drum. This can be accomplished by unscrewing the lock nut B and turning the bolt to the left about a quarter-turn until the clamping bar D is released.

Next, rotate the wheel until the opening registers with the adjusting screw E. Turn the last named member until that part of the brake lining in line with the screw E is brought as close to the inner surface of the brake drum as possible without touching it. Turn the wheel until access is obtained to the six locking screws N, and loosen these. Turn the two adjusting screws F F, which have right hand threads on one end and left on the other, until the centre of the pin G stands about .75 inch back of an imaginary line drawn through the centres of the two pins H H, when the brake is applied.

With the brake released, adjust the screw I in the lever J and the stop screws K K until the lower and upper parts of the brake band lining clear the drum about .03125 inch. The three coil springs M should have sufficient tension to hold the brake band sideways, and against the stop screws K K so it will not rattle. It is important that the screws N be locked after completing the work, also that the cover of the opening in the drum be replaced and fastened securely.

It is equally important to make sure that after

adjusting the brakes the lining material does not drag. Run the car a short distance and place the hand on the brake drums. If they are heated,



Showing Capacity of Model T Ford Fuel Tank in Gallons, Corresponding to Inches and Fractions Thereof.

it will indicate that the friction material is making contact with the drums and an inspection should be made to ascertain the fault. The linkage of the brake mechanism should be lubricated and compensation for wear should not be made by adjusting the pull rods.

MEASURING TANK CAPACITY.

The average new owner wishes to learn how many miles he is obtaining to a gallon of fuel and if accurate data be desired it is necessary to know the exact capacity of the tank. This is generally stated in the instruction book or catalogue, but, in the opinion of the writer, if fine results are to be obtained, it is a good plan to check the capacity of the fuel container.

This may be accomplished by one of two ways—by figuring its capacity or by actually demonstrating this point. The latter method is simple and consists of emptying the container of all fuel and refilling it. This plan has an advantage in that it affords an opportunity to clean the vessel, and even with new cars foreign elements have been known to exist in the fuel tank.

Having emptied the container it is a simple matter in replenishing the supply of fuel to check the height of each gallon of fuel. Take a piece of soft pine, which is easy to work, and cut it to about one inch wide and from .25 to .375 inch thick. It should be sufficiently long to touch the bottom of the tank and extend a couple of inches above the top of the filler cap. Smooth the stick by sandpapering.

Some paint the measure with black paint, but a simpler method is to use powdered graphite, rubbing it on well and polishing it afterward. This will leave a smooth, black surface, not affected by the action of gasoline and one on which the fluid will show clearly.

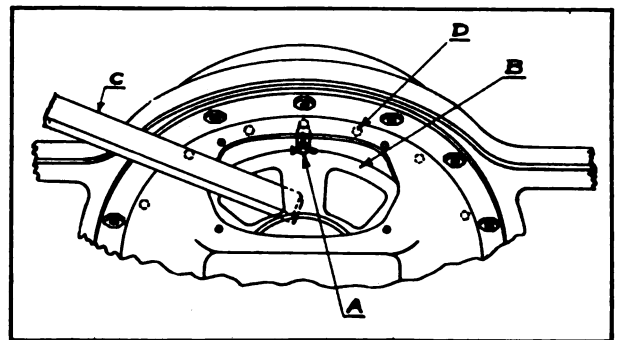
With the fuel tank empty, pour in exactly one gallon of fuel, then insert the measure and note the height, marking it. In placing the measure in the tank, insert it gently so as not to splash the liquid above the normal level. Add another gallon and mark the measure, repeating the operation until the tank is filled. This method was utilized by the writer in making a measure for a tank which was of peculiar shape.

In an accompanying illustration is presented a diagram issued by the Ford Motor Company for making a measure for the fuel tank used on the model T Ford car. The relation between the height at which the liquid stands and the volume it occupies is clearly depicted, and by making a stick and marking it according to the diagram, the motorist will be able to learn how much fuel is in the container and how many miles have been obtained from the gasoline used. All fuel measures should be kept clean and never placed in the tank if dirty. With some motors the opening of the spraying nozzle is so fine that a small particle of dirt will clog it easily.

EMPIRE MODEL 31 CLUTCH.

The clutch is an important factor in the operation of a motor vehicle. In these days of refinement in mechanical construction a well designed clutch rarely gives trouble if the instructions of the maker are followed as to care and maintenance.

Some owners have a habit of not looking after the components of the chassis until trouble is experienced, believing it is best to leave all parts alone until they actually require attention. This is an error, for there is a certain amount of work that is necessary if efficiency is to be maintained and the repair bill avoided. This point is emphasized



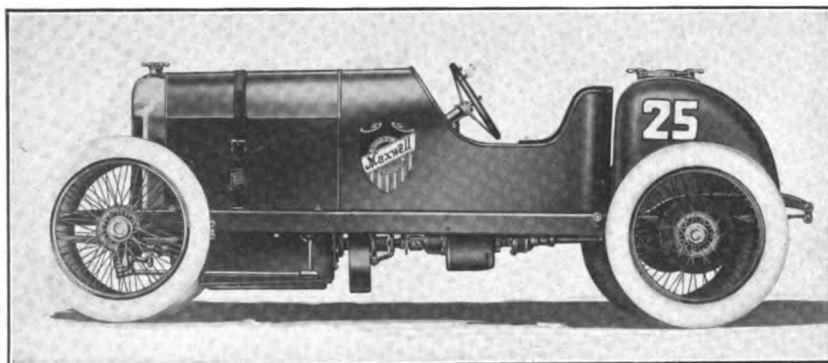
Adjustment of Clutch on Model 31 Empire Is Made Easily, Because of Simplicity of Construction.

phasized in the instructions given by the Empire Automobile Company as to the care and maintenance of its 1914 model 31 machine, and similar

views are held by practically every manufacturer.

The period of adjustment of a clutch will depend upon the service it has been subjected to. For example, some drivers use the clutch intelligently, while others abuse it. Properly used a clutch will perform its function for a considerable length of time.

If it is found that the clutch slips, it is advisable to try simple methods before adjusting it. First drain off all of the old lubricant, then replace the plug and fill the clutch compartment about half full of kerosene. Next, alternately engage and disengage the clutch to allow the fluid to penetrate to all parts of the construction, and it is a good plan to run the motor during this work. If the car is standing still, be sure to place the gear lever in neutral. Drain off the kerosene and refill the clutch compartment with lubricant, then try the action of the clutch out on the road. If it does not act satisfactorily it must be adjusted to eliminate slipping.



One of the Maxwell Specials Constructed Under the Direction of Ray Harroun for the 500-Mile Race.

To increase the clutch spring tension, displace the clutch cover and turn the motor over until the locking plunger A, shown in an accompanying illustration, appears. This plunger member pins the flywheel and the compression plate B together. Pull out the plunger and turn it a quarter-turn, which will disengage it. Next, disengage the clutch and hold it out by using a stick of proper length, bracing the stick against the front seat heel board.

By utilizing a bar or wrench, denoted by C in the drawing, the compression plate B may be rotated to the right until the locking plunger A coincides with the next hole D in the flywheel. Return the locking plunger to its seat and try out the action of the clutch. If it continues to slip, another adjustment must be made. It should be borne in mind that the adjustment must not be made with the clutch engaged, as the adjusting

plate B cannot be rotated in either direction with the clutch in.

To decrease the spring tension, remove the plug in the flywheel housing and turn the motor over until the small hole in the rim of the flywheel shows. Insert a bolt or pin in this hole to lock the flywheel and proceed exactly as outlined for tightening the clutch, but, of course, the compression plate is rotated in an opposite direction—to the left instead of right.

THE THREE MAXWELLS.

Machines Designed by Ray Harroun Nearly Ready for Their Test Trip.

For some few weeks it has been known that Ray Harroun, well known in automobile racing fields and as the inventor of the Harroun carburetor, was working on three Maxwell cars, scheduled to take part in the forthcoming 500-mile international sweepstakes race on the Indianapolis speedway, Memorial Day. It is now announced that these machines are nearly ready for their test trip, and that Harroun confidently expects they will develop sufficient speed to encircle the track, 2.5 miles, in 1:37, which is one second faster than any car has yet negotiated a lap on that course. One of the machines is shown in an accompanying illustration.

Unusual interest attaches to this announcement, from the fact that the Maxwell cars were withdrawn from racing some two or three years ago, when they were being produced under the direction of the old United States Motor Company. Of course it is well known that the men now in charge of the Maxwell Motor Company have very different ideas concerning a number of things, and the matter of racing appears to be one of them.

Maxwell Motor Company officials are quoted as saying that, while the company enjoys a large export trade as it is, it intends to go after foreign business as vigorously as that at home. Racing, or competing with well known machines of foreign make, is held to be one of the satisfactory ways of accomplishing this end. Therefore, these specially designed cars have been constructed to compete with the foreign machines entered in the world's long distance track race of the year.

WHAT MAINTENANCE COSTS.

Interesting Figures Revealed by KisselKar Owner in Madison, Wis.

Many times prospective owners seek reliable information as to the maintenance cost of an automobile. Chauncey E. Blake, a well known lawyer of Madison, Wis., who has kept an accurate record of such costs, including every possible incidental expense, has forwarded some interesting data on this subject to the Kissel Motor Car Company, Hartford, Wis.

Mr. Blake purchased a 1912 KisselKar 40 in December, 1911, and placed the machine in service in March, 1912. During that year his mileage was 5128.6, and in 1913, 3740, making a total of 8868.6 miles. He states that it has been in use in all kinds of service; that is, cross country driving, shopping and doing errands about the city, and in all seasons.

His figures show that since it started in service this car has cost just under 2.4 cents a mile for gasoline, this being the average under favorable and unfavorable conditions, touring or doing shopping with the car standing at the curb and the engine running free. The cost for oil and lubricants has been 24 cents a mile. Tires figure at 4.8 cents a mile, and this, he says, has been increased by reason of accident and faulty tires. He is now figuring about 4200 miles a casing.

The cost of repairs, exclusive of time, has been \$38.25, of which \$27.25 was expended for a coat of varnish. Insurance figures at \$37.50; license, \$10; lighting, such as gas tanks, new lava tips, oil, etc., \$18.70; electricity, \$6; incidentals, including anti-freezing solutions, rubber tubing, subscription to highway fund, motor magazines, etc., \$26.70. The total charges for time against the car aggregate \$144.74. This includes washing, delivery and occasionally a driver.

At the time the letter was written, the car was undergoing its first general overhaul, and Mr. Blake states that he was surprised to find that the bearings, gears and all working parts showed absolutely no wear.

AN ENDLESS SAND BELT.

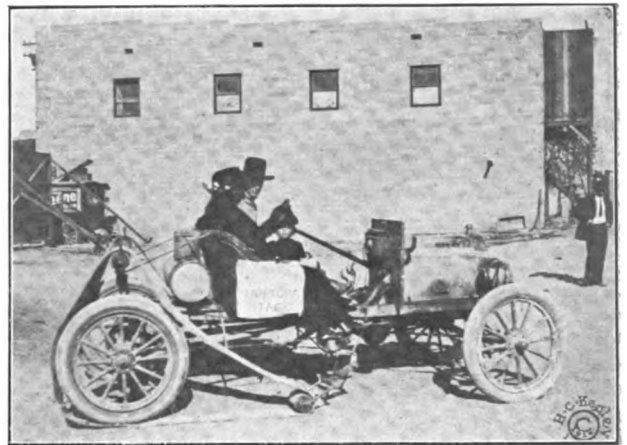
Novel Device in Use of Overland Stage Crossing the Colorado River Basin.

Necessity is the mother of invention. Some time ago George L. Johnson of Holtville, Cal., purchased an automobile with which to operate a stage line between that town and Yuma, Ariz., a round trip distance of 56 miles, a greater por-

tion of the route being across the great desert of the Colorado river basin. At first he attempted to make use of the regulation strips of canvas, which are commonly spread for machines to travel over, where long stretches of sandy trail are encountered. He soon found, however, that these were impracticable, for the reason that there was so much sandy waste he was busy most of the time spreading canvas.

Thus was the necessity established. Mr. Johnson invented the sand belt, which consists of an endless belt of 12-inch traction engine belting, so arranged on light rollers that it glides over and under the wheels of the car as the machine progresses, as indicated by an accompanying illustration. It may be added that the photograph was taken when the stage was stripped for a race at the fiesta in Holtville, New Year's Day. It won, too.

When used as a stage, the machine carries a



George L. Johnson's Sand Belt Attached to Rear Wheels of Overland Stage in California.

five-passenger body, and sand belts are employed on the front wheels as well as those at the rear. The stage line was established as the result of a natural demand for some reasonably rapid means of transportation, there being no direct train service between the two points. The automobile lays its own track of endless belts throughout 56 miles daily, for which service, Mr. Johnson receives \$7 a person one way, or \$12 for the round trip. Application has been made for a patent on the sand belt, so it is expected that it will add another percentage to the profits of the line.

Benjamin Briscoe, president of the Briscoe Motor Company, New York City, while at the factory in Jackson, Mich., recently, stated that the first Briscoe cars will be ready for delivery by April 15.

WITH THE CYCLECAR MANUFACTURERS.

Prospective Purchasers Should Be Informed as to Their Ability to Secure Machines If Ordered---Constructional Details of Some Models Announced Recently.

CONDITIONS surrounding the establishment of the cyclecar branch of the industry have been such as to foster extravagant claims for a number of makes of machines which have as yet progressed but little, if any, beyond the blue print stage. That the public is eager to secure a practical motor vehicle that can be operated at small cost, such as the cyclecar is claimed to be, is decidedly evident from the flood of inquiries which has made its appearance since the announcement of the first experimental models.

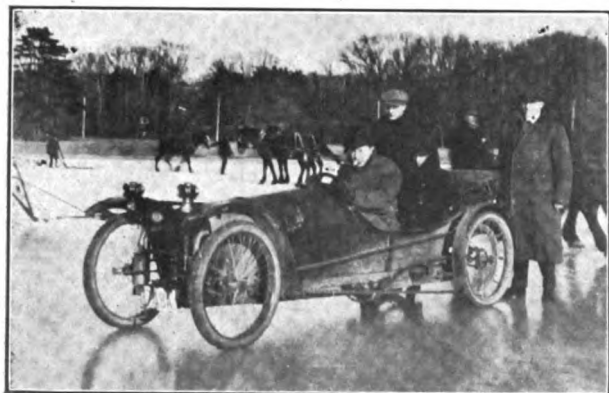
Engineers, who have been working on cyclecar designs, have had the benefit of the experience accumulated through the production and use of automobiles. However, the public cannot expect that exactly the same application of prin-

of the manufacturer to make delivery of cars.

Little is to be gained by an attempt to mislead the public. There is a certain market for the satisfactory cyclecar, and those who are intent upon meeting this demand should find little trouble in disposing of their products, but the sale of stock in a cyclecar company is an entirely different matter. It may be somewhat difficult to differentiate between the manufacturer who is honestly trying to provide a machine which shall prove satisfactory in the hands of owners and promoters who are making the most of the opportunity afforded by the widespread interest in such vehicles to make money in the easiest way. The Automobile Journal hopes to present, in each instance, so far as it is able to secure such facts, information which will enable the reader to make his own deductions.

IMP ON CHARLES RIVER.

President E. P. Blake of the Cyclecar Club of New England Makes Fast Time.



E. P. Blake, Boston, and His Imp on Ice of Charles River.

ciples can be made in a machine designed and constructed along the simplest lines. Theories have been advanced, and some of these apparently have been substantiated in road tests, but conservative automobile men are convinced that their practicability cannot be determined beyond question until cars have seen service in the hands of users.

From the first, The Automobile Journal has sought to lay before its readers all the information available concerning these newer machines. It has presented such details and mechanical specifications as it has been able to secure from those who have sought to enter this field, and it proposes to continue this practise. It has felt that prospective buyers should be in a position to at least form some opinion as to the ability

Apparently the history of the cyclecar branch of the industry is to be largely in the nature of a repetition of that of the automobile itself, at least insofar as the publicity campaign is concerned. In days gone by, attention was directed to automobiles by the performance of unusual tasks, therefore, the cyclecar may be expected to emulate the example of its older brother, so to speak.

An accompanying illustration shows E. P. Blake of Boston, president of the Cyclecar Club of New England, in his Imp on the ice of Charles river. Just before the opening of the Boston automobile show, Mr. Blake drove this machine five miles out and return on this ice, and is said to have covered the distance in 12 minutes; the last mile in 53 seconds.

What may be considered a decidedly more interesting demonstration of the practicability of the Imp lies in the statement that Mr. Blake, who is the New England distributor for this make of cyclecar, has used one of these machines daily for the past six weeks in driving to and from his home at Tufts College hill, Medford, Mass., and his office in Boston.

MORE ABOUT THE BANTAM.**Quantity Production Will Depend upon the Manner in Which It Is Received.**

It will be remembered that one of the new models revealed at the recent Boston automobile show was the Bantam, made by the Bantam Motor Company of that city. Among those actively identified with this concern is F. J. Tyler, who is well known in the New England field through his connection with the sale of Maxwell cars, both as agent for the old Maxwell-Briscoe Motor Company and later as branch manager for the United States Motor Company.

Mr. Tyler explains that every effort has been made to produce a cyclecar which shall represent the best of material and workmanship, and he asserts that components utilized have the same strength as some of those employed with the small Maxwell model produced a few years ago. His purpose in calling attention to this detail is to indicate that while the Bantam weighs but 700 pounds, it is contended that it has a factor of safety which would meet the demands of a car of twice its weight.

The first models of the Bantam were produced in the factory of the Lenox Motor Car Company in Boston, although that company has no interest in this machine. It is probable that this plant will be used for the present, since Mr. Tyler states that no attempt will be made toward quantity production until the public has had ample opportunity to test the cars in actual service. This is taken to mean that only a comparatively few machines will be made at first, perhaps 100, and that no steps will be taken to secure permanent factory facilities until every detail concerning the little car has been thoroughly worked out.

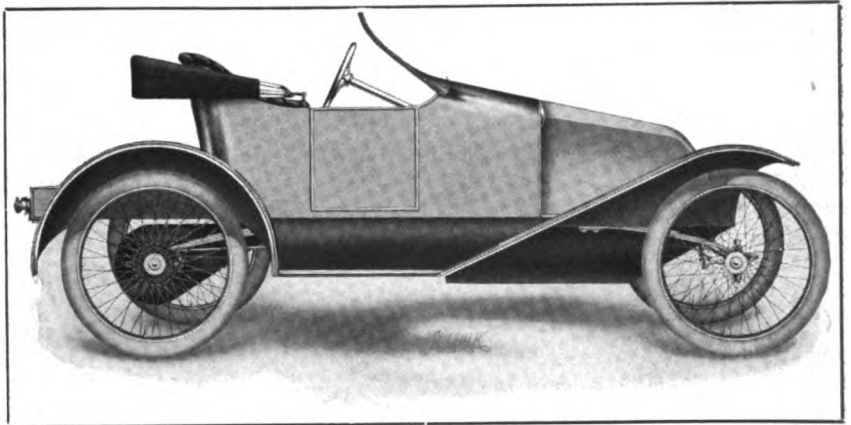
The Bantam is a true cyclecar of the roadster type, seating two passengers side by side, with the driver at the left and the control levers in the centre. There is only one door, at the right. At the rear is a compartment for luggage, which also provides room for a set of dry cells supplying current for electric lights front and rear. The wheelbase is 86 inches and the tread 46.

The motor is a two-cylinder, air-cooled V unit, with bore of 3.5 inches and stroke of 3.75,

rated at 9-14 horsepower. Power is transmitted by friction discs and chain to a semi-floating rear axle, in which the usual differential is incorporated. The wire wheels are fitted with 28 by three-inch tires.

ANOTHER CLEVELAND MACHINE.**Company Will Be Formed to Produce Car Designed by English Engineer.**

Announcement is made from Cleveland, O., that after two months of experimentation the Cleveland cyclecar will make its appearance in the near future. A company, to be known as the Cleveland Cyclecar Company, is to be organized with capital of \$150,000, those interested in the venture being Robert Clark, W. E. Burns and W. H. Noyes. Clark is said to have been engaged in cyclecar development in England.

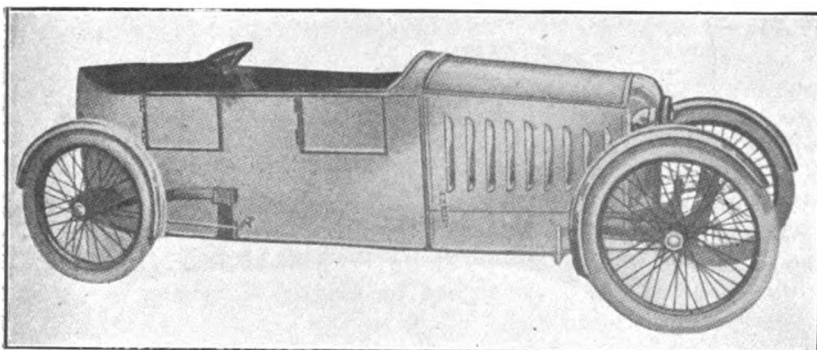


Bantam Roadster Design, Which Is Being Produced in Limited Numbers by Boston Concern.

The machine is to be with wheelbase of 96 inches and tread of 36, equipped with interchangeable bodies, of the roadster and package delivery type. The motor will be a four-cylinder unit. Final drive will be by belt. Other details have not as yet been made public.

MERCURY ELECTS OFFICERS.**Stockholders Hold First Formal Meeting and Men Give Up Other Active Connections.**

The first formal meeting of the stockholders of the Mercury Cyclecar Company, Detroit, was held Feb. 21, at which the following officers were elected: President, W. J. Marshall; vice president, H. A. Burnett; secretary and treasurer, R. C. Albertus. Henry H. Henderson also has joined the forces of the company as production



Tandem Seated Greyhound, Which Follows Bedella Example, Locating Driver at the Rear.

manager and has assumed his new duties.

According to a recent announcement of the company, Mr. Albertus and Mr. Marshall, who have been identified with the automobile business for a number of years, have given up all other active connections. Burnett has been associated with the Digestive Ferments Company, Detroit, for a number of years as sales manager. He does not give up his other connections, and acts largely in an advisory capacity. It is further stated that the first carload of Mercury cyclecars left the factory March 4, and that it is anticipated that carload shipments will be made at regular intervals from now on, going to all parts of the country.

NOVEL SEATING ARRANGEMENT.

Real Cyclecar Provides for Three Passengers and Has Motor at the Rear.

A true cyclecar seating three persons is announced by the H. Paul Prigg Company, Anderson, Ind., which is said to have acquired the plant formerly occupied by the Spring Steel Fence & Wire Company at Brown street and the Central Indiana railway. This is termed the Real, and has wheelbase of 100 inches and standard automobile tread, 56 inches. The driver sits in a single seat in front, while the rear seat is 33 inches wide, affording ample room for two persons. In this respect, at least, the Real occupies a distinct place in the American industry.

The motor is a Wizard, two-cylinder, air-cooled unit, with bore of 3.375 inches and stroke of 3.875, being rated by the maker at 10 horsepower. This is mounted at the rear of the

car. A specially designed friction transmission affords any number of speeds either forward or reverse, and final drive is by Peerless V belt, fabric covered, operating on short centres and small pulleys.

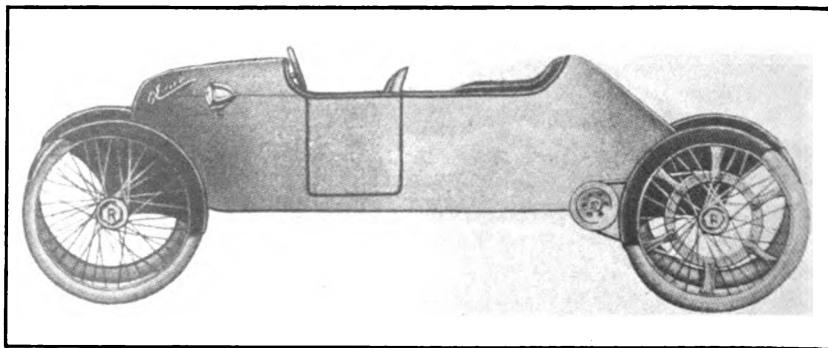
The frame is of spruce, reinforced with truss rods and armored corners. Suspension is by semi-elliptic springs, mounted on swinging shackles. Wheels are of wire, fitted with 30 by three-inch tires. The steering gear is of the standard rack and pinion type, and a mechanical starter is supplied, this being operated from the seat. A top, windshield and electric lights are listed as extra. It is added that a special type of delivery body can be furnished upon order.

GREYHOUND FROM TOLEDO.

Tandem Seated Machine Which Made Its Appearance During Recent Show in That City.

The Greyhound made its appearance during the recent automobile show in Toledo, O. It is the product of the Greyhound Cyclecar Company, with offices in the Nicholas building, in that city. The one model which has been made public has tandem seating, with wheelbase of 104 inches and tread of 38. No weight is given, but such details as are available would seem to place it in the true cyclecar class.

The motor is a De Luxe two-cylinder, air-cooled unit, presumably of standard dimensions. Ignition is by the Atwater Kent Unisparker system. Power is transmitted by friction discs and V belts, to the rear wheels. All four springs are of the cantilever type. The wire wheels carry 28 by three-inch tires. Contrary to the usual



Real Accommodates Three Persons, with Driver in Single Seat in Front.

practise in this country, although following the example set by the original cyclecar, the Bedelia of France, the driver is located at the rear.

DETAILS OF THE RITZ.

Second Model Made Presents Features Indicated as Desirable After Experimentation.

Several months ago, announcement was made in these columns of the organization of the Ritz Cyclecar Company, New York City. The officers are: President, Carl D. Ritzwoller; vice president, S. Katsaurer; secretary, treasurer and general manager, A. Russell Smith. The experimental work has been carried on at 246 West 65th street, although it is stated that the concern proposes to move to a larger factory in the near future, or as soon as the plans for production will permit.

The present Ritz model is the second made by the company, and is said to represent changes which have been adopted as the result of road tests and other experiments. The machine is a true cyclecar, with wheelbase of 98 inches, tread of 44 inches and weight of 650 pounds. The two passengers are seated side by side.

The motor is a two-cylinder, air-cooled V type unit, rated at 10-12 horsepower. Lubrication is by splash, with sight feed; carburetion by a Schebler, and ignition by a Bosch magneto. The transmission is by planetary gear, with a specially designed selective gearset, affording two speeds forward and reverse, and final drive is by shaft to a bevel gear rear axle.

MORSE HAS FRONT DRIVE.

First Model of This Type Makes Its Appearance from Pittsburg, Penn.

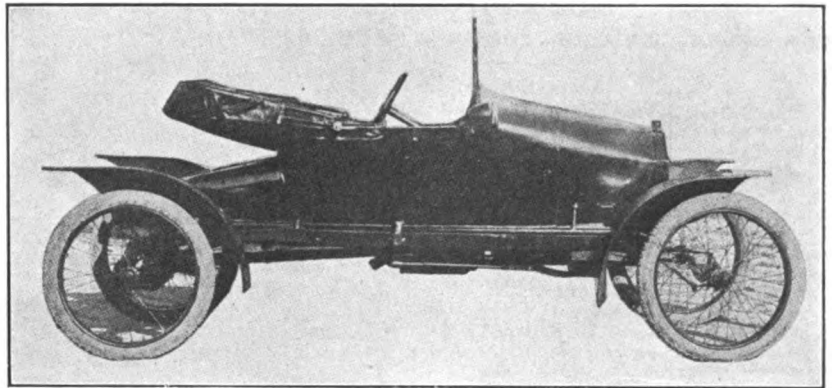
The Morse Cyclecar Company, 520 Lang avenue, South, Pittsburg, Penn., is announcing the Morse true cyclecar, which differs from standard practise, if this term may be applied to the cyclecar industry in America at this stage of its development, in that it employs a front wheel drive. In all other respects, it is of conventional appearance, the body seating two passengers tandem. The wheelbase is 105 inches and the tread 36.

The motor is a De Luxe twin, and power is transmitted to the front wheels through a planetary gearset, affording two forward speeds and reverse, and chain. The details of the steering mechanism are not fully disclosed in the preliminary announcement, although it is stated that the axle is fitted with universal joints in order to permit of utilizing the front wheels for both driving and steering. The body is suspended on cantilever springs, and brakes work on belt pulleys attached to the rear wheels, as well as on the front wheel drive.

NO STOCK FOR SALE.

Columbia, Ultimately to Be Front Wheel Driven, Announced in Seattle, Wash.

Right in the forefront of its announcement of the Columbia, a true cyclecar, by the American Cyclecar Company, Seattle, Wash., it is express-



Latest Model of Ritz Cyclecar, a Roadster Type Made in New York City.

ly stated that it has no stock for sale. Incidentally, it may be noted that the name of the company is the same as that located in Bridgeport, Conn., although there is no connection between the two. A factory is said to have been secured, this being a two-story brick building in the centre of the city. The officers of the company are: President, Daniel Murray; vice president, M. M. Cosh; secretary and general manager, George L. Grant.

The machine will have a wheelbase of 92 inches and tread of 40, seating two passengers side by side. The motor will be a two-cylinder, air-cooled, V type unit, with bore of 3.375 inches and stroke of 3.9. At present a friction transmission will be employed, with V belt drive to the rear axle, but application has been made for a patent on an entirely new front axle, providing for front wheel drive, and machines of this type will be constructed in the near future.



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THE MOTOR TRUCK

AND

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THE MOTOR TRUCK.

The question of directing the attention of the business man to the merits of the mechanical transport has not been settled by the decision of the manufacturers to abandon the commercial vehicle shows in New York and Chicago. The success which attended the holding of the annual Boston motor truck show was such as to indicate that those who are giving consideration to this subject are anxious to take advantage of every opportunity to make comparison of the various types and models.

The Boston show was distinctive this year as being the only exhibition of its character of national prominence. Other cities held local displays, but the Boston show always has been, and probably always will be, of more than local importance. Apart from the fact that it is the

largest in the industry, it attracts patronage from a wide section—practically all of New England and a large portion of the Maritime Provinces of Canada.

The display just ended demonstrated very clearly the rapid development made by this branch of the industry during the last year. It is only a few years since manufacturers were installing a different type of body on a pleasure vehicle chassis and calling it a business wagon or truck. Today the product offered for the consideration of the business man is a specialized design, built throughout to meet the service for which it is intended.

Manufacturers, engineers and designers have made an exhaustive study of operating conditions. Motor trucks have now been in service sufficiently long to enable the collation of facts which show definitely the results that may be obtained. The efficiency engineer has made his appearance, and with him a trained corps of efficiency experts who are able to offer the business man information that can only be secured as the result of experience. There is a vehicle for every need, whether it be the delivery of small packages or the hauling of immense loads. The prospective purchaser has only to let his wants be known, and the industry is able to supply them.

AN ELECTRICAL AGE.

If it be true, as it would seem to be upon investigation of the history of the automobile industry, that each year has witnessed some particular feature in construction or design which has marked the vehicle of that year as somewhat distinctive from its predecessors, then 1914 is a year of electrically equipped machines. Electricity played an important part with the 1913 models, but analysis of the specifications presented in connection with the show season, just brought to a close, indicates that very nearly all makers either fit electric lighting and starting as standard equipment, or offer it as an extra.

With electric lighting and motor starting and electric gearshifts already installed on 1914 models, and the recent announcement of an electric brake and an electric transmission, it would appear that the 1915 car was to be about as near electrically controlled as was possible to make it.

RENAULT FOUR-WHEEL DRIVE TRACTOR.

Well Known Manufacturer Produces Entirely New Model, Incorporating Features Demanded by French Military Requirements--Details of Construction.

ALTHOUGH it cannot be held that front wheel driven trucks and trailers are entirely new, machines of this type having been on the market both in this country and abroad for a number of years, interest in them has been increased very materially of late, by reason of the prominence given them in the military trials in France this month. One of the newer designs is the Renault, made by Renault Freres, Billancourt, France, this having been built to comply with the army regulations, although in a general way it follows standard practise with this company.

The Renault pleasure car is well known in this country, and the truck bearing that name has been described fully in these columns. It is only necessary to state that the motor used in this newest vehicle is a four-cylinder unit, cast in pairs, with bore of 130 mm and stroke of 160 (5.1 by 6.29 inches). Cooling is by thermo-syphon, but instead of vanes on the flywheel and an air tight underpan, there is a fan at the back of the radiator, which is at the rear of the motor, as with all Renault machines, driven by belt running over a pulley just behind the flywheel. This fan is enclosed by an aluminum casing bolted to the rear of the dash, and has a central quick detachable cover to enable the driven pulley to be reached without taking down the entire casing. Louvers are cut in the rear portion of the bonnet, so that air can be drawn through the central radiator tubes, and a sheet metal V section guard is fitted between the rear cylinder and the cooler, so that the current of air going through the bonnet may be directed onto the central tubes and not onto the engine.

The clutch is of the inverted cone type, and there is a spring disc coupling between it and the gearbox. The whole of the mechanism between

the two is encased by an aluminum housing forming an extension to the gearbox. The lower half of this housing is fixed and the upper half is readily detachable. The arrangement allows the whole of the coupling and clutch withdrawing mechanism to run in oil, and has already been employed on other Renault truck models for more than a year.

Naturally, the gearbox is of special type. It affords four speeds forward and reverse, comprising usual primary and secondary shafts. On the primary is a central crown wheel engaging with pinion mounted on a shaft in the same vertical plane, this latter transmitting power through a front and rear propeller shaft to the respective axles. Each of the propeller shafts has a univer-

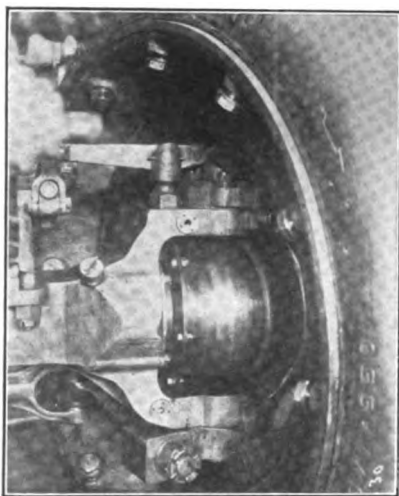


Renault Four-Wheel Drive Tractor and Two Trailers, Taking Part in the French Military Trials.

sal joint at each end. The axles are of the well known Renault design, comprising a one-piece forging with a central cradle, and with a cast steel cover on the driving end and a detachable aluminum cover on the other.

The front axle is bored out to receive the driving shafts, and, as the front wheels must steer as well as drive, there is an enclosed universal joint on the end of the shaft, within the steering pivot, as shown herewith, in the smallest illustration. Since a differential lock is necessary, this is provided by means of a lever in the change speed sector, with connections passing through the gearbox, left and right, to the two differentials.

There are three hand levers, as indicated, that



Universal Joint Arrangement in Renault Front Wheel Drive.

heavy platform at the extreme rear, and is driven by shaft and enclosed worm gearing. In addition to the external contracting brake at the rear of the gearbox, there is an internal expanding brake in each of the four wheels.

Cast steel wheels are employed, these being fitted with solid twin tires, 1055 by 130 mm (41.5 by 5.5 inches). Provision also has been made for the attachment of tire chains by fitting a series of hooks at intervals on the inner face of the rim, which permit the chains to be hooked on quickly whenever it becomes necessary to use them over the soft ground.

The steering gear is duplicated, of course. A worm on the steering column engages with a sector on a horizontal shaft, set just within the right frame member. This shaft has two worms, one of which engages with the sector carrying the lever arm for the front wheels, and the second with a corresponding sector and lever connected with the rear wheels. From these two points the control is exactly the same as on the ordinary models.

Suspension is by semi-elliptic springs, front and rear. Each of these has a sliding shackle at the rear, and is 5.5 inches wide. Towing hooks are fitted at the

at the left being the differential lock that in the centre, the change speed, and on the outside, the hand brake. The change speed lever also engages the capstan drive, which is at the left of the chassis, as viewed from the rear. The capstan itself is mounted on a

front of the chassis, and there is a quick action spring mounted coupling at the rear, and a very powerful sprag is hinged from the rear axle, in accordance with army requirements.

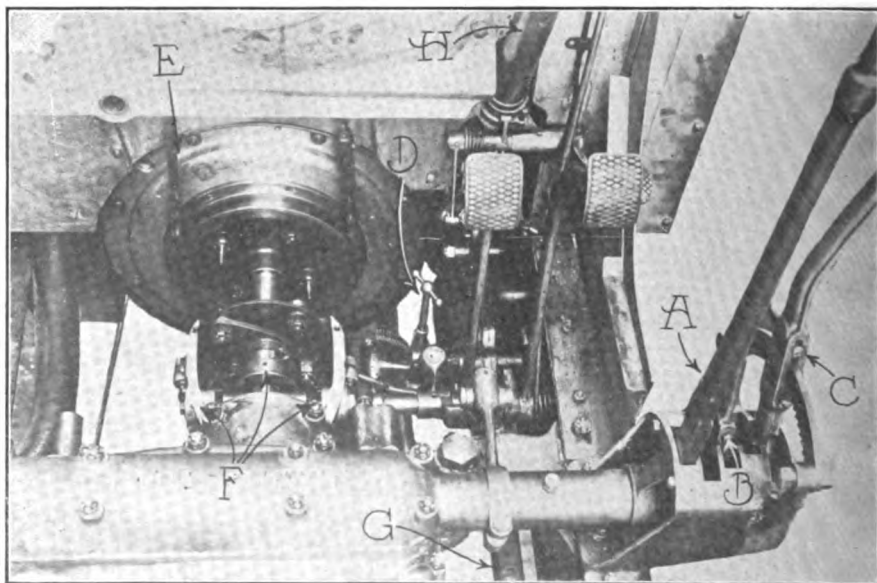
The largest illustration shows one of the Renault front drive tractors as fitted for competition in the military trials, hauling two trailers shod with steel tires.

SPECIAL RAYFIELD PRIZE.

Edwin Pullen, Winner of Grand Prize Event, Receives Pleasant Surprise.

It became known this past week that Edwin Pullen, who won the recent Grand Prize at the wheel of a Mercer car, being the first driver to pilot an American machine to first position in this international classic, was presented with \$250 by the Findeisen & Kropf Manufacturing Company, Chicago. It appears that Pullen used a Rayfield carburetor, made by this concern, and the gift was in the nature of an expression of the company's appreciation of his remarkably successful driving. Walter Findeisen explains the award as follows:

It gives us the greatest pleasure to say that Edwin Pullen selected the Rayfield carburetor of his own mind, and did so because he found in his experience that it was the best carburetor and most dependable for his purpose. He was not urged to use it, and therefore we are all the more gratified over his success, knowing that his own confidence in its dependability of service determined his selection.



Constructional Details of Renault Four-Wheel Drive Tractor: A, Differential Locking Lever; B, Change Speed Lever; C, Brake Lever; D, Foot Brake Adjustment; E, Fan Belt Drive; F, Enclosed Disc Universal; G, Rear Wheel Drive Rod; H, Steering Column.

CORRESPONDENCE WITH THE READER.

QUESTIONS ANSWERED BY MAIL.

F. J. Hughes, East Cambridge, Mass. Piston Rings.
J. A. Boudreau, Meteghan River, N. S. General.
K. K. Kornstein, St. Louis, Mich. Master Vibrators.

Ed. Note—The correspondence columns are open to all readers of *The Automobile Journal* and trade. Names of contributors will not be published if so requested, and when desired questions will be answered by mail. When the information is of an educational nature the editor of this department reserves the right to publish the question, but will make use only of the initials of the writer.

Horsepower Ratings—E. J., Newcomerstown, O.

Will you please explain why there is so much difference between the horsepower claimed by the manufacturer of some cars and the S. A. E. rating for the same? For instance, the Studebaker Four is claimed to have 35 horsepower and the S. A. E. rating for the same is 19.60. The Oakland claims 35 and the S. A. E. is 19.60. Are these manufacturers deliberately trying to deceive their customers or are they justified in making such claims, and how about the discrepancy between their ratings and the S. A. E.?

In analyzing the horsepower ratings in question it should be borne in mind that the S. A. E. formula is based on the bore of the cylinder and that the stroke is not considered. For example: A four-cylinder motor having a bore of five inches and stroke of seven, is rated at 40 horsepower by the S. A. E. formula and one having a bore and stroke of five inches is rated the same.

It is obvious that, all other conditions being equal, the motor with the seven-inch stroke will develop greater power because it has a greater piston displacement; that is, it is capable of containing a larger quantity of explosive mixture than the cylinder having a bore and stroke of five inches.

As previously stated, the S. A. E. formula does not consider the stroke, merely the bore, and this explains why there appears such a discrepancy between its ratings and those claimed by the maker. It should also be borne in mind that two motors of different makes or designs, and both having the same bore and stroke, will vary as to the horsepower developed.

The writer is of the opinion that the cars mentioned are conservatively rated by the manufacturers, as usually is true where the maker's rating and that of the S. A. E. fail to coincide. As an example of the wide variance which may take place, the Mercer four-cylinder motor has a bore of 4.375 inches and stroke of five. According to the S. A. E. formula the horsepower is 30.6, but the maker states that it must show a dynamometer pull of 58 horsepower at 1700 revolutions a minute before passing inspection. Other manufacturers rate their motors according to block tests, not by the S. A. E. formula, which does

not always indicate the actual horsepower that the motor is capable of developing.

The fact that the bore only is taken into consideration for registration purposes, may be said to be largely responsible for the increase in piston travel and decrease of the bore of motors used abroad, a practise that is being adopted generally in this country.

Changing Rims—F. R. N., Sioux City, Ia.

Having a machine equipped with clincher rims, and wishing to change these for the Firestone demountable type, what steps will be necessary and can I do the work?

To fit demountable rims to the wheels will require turning the wood felloe to a certain width and diameter. For example: The approximate wood wheel diameter for a 34 by four-inch clincher rim is 25.6875 inches, while that for the Firestone demountable is 24.6875 inches.

Assuming that the tire size is 34 by four inches the wood felloe C, Fig. 2, must be turned to 1.75 inches.

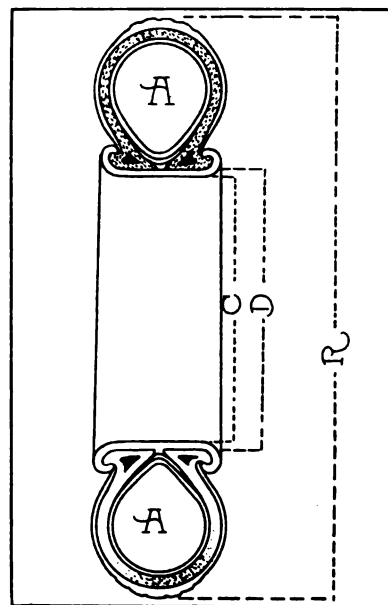


Fig. 1—Clincher Rim Dimensions.

As there is a slight variation in the circumference of the steel felloe band B, the proper circumference of the wood felloe should be determined by using a traveller on the inside of the steel felloe and noting the measurements. The wood felloe is then turned off, allowing about .125-inch draft, taking care that the outside circumference of the steel felloe band, when applied to the wheel, does not vary more than .046875 inch from six feet, 6.75 inches. This dimension is indicated by D.

To apply the steel felloe band, it is heated to about 550 degrees Fahrenheit and cooled slightly about the valve hole to prevent stretching at this point. The band should be applied with valve hole so placed that the bolt holes will not pass through the tenons of the spokes nor through the

felloe joints. The Firestone Tire & Rubber Company, Akron, O., supplies an instruction book containing illustrations showing the proper po-

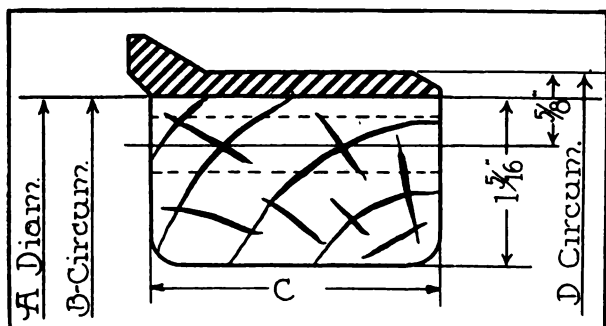


Fig. 2—Showing Dimensions to Be Considered in Replacing Clincher Rims with Demountable.

sition of the bolt holes and valve apertures for different sized wheels. In fitting the felloe band, it should be flush with the face of the wood felloe. For drilling the bolt holes and for locating the brackets utilized, it will be essential to use a jig manufactured by the company for this work.

A specially constructed valve hole is necessary. Its front side must be straight, while the opposite side is tapered, making the finished hole .65625 inch at the inside of the wood felloe and .875 inch at the outside. The straight side is made by drilling a hole .65625 inch in diameter through the wood felloe, with the drill pressing against the front side of the valve hole in the steel felloe band. The tapered side is obtained by filing, burning or gouging out the wood to coincide with the .875-inch hole in the steel felloe band. The back washers used with the bolt assembly should fit snugly against the wood felloe and the steel felloe bands. It is necessary to drill a .3125-inch hole in the wood felloe at the point where the dowel pin, which is a part of the rim assembly and is riveted on the inner side of the rim base near the valve hole, is located.

From the above it will be seen that the fitting of demountable rims to wheels formerly equipped with the clincher type will require experience. It would be cheaper and decidedly more satisfactory to have the work performed by concerns making a specialty of fitting rims or by a competent wheelwright.

Overland Model 51—L. M. C., Hyman, S. C.

I have a model 51 Overland which needs new pushrods and bushings. Will you give me some information in the columns of your journal about putting these in, also the timing diagram for the motor?

To properly install pushrod bushings with the motor in question, it will be necessary to remove the lower half of the crankcase, also the camshaft, as the bushings are designed with a shoul-

der which makes it impossible to fit them from above. The bushings are retained in their correct position by locking screws which extend through the aluminum crankcase housing.

It is also necessary to install the pushrods from below at the same time the bushings are fitted, as the space between the aluminum pushrod bushing housing and the valve stem guide of the cylinder is not great enough to allow for the removal of the square type pushrod even after the adjusting screw has been entirely removed.

The flywheel fitted to the motor is 18 inches in diameter and at Fig. 3 is presented the valve timing diagram. This will not be necessary, however, as the flywheels of the Overland motors are marked, showing the opening and closing points for the different valves.

Before displacing the camshaft, mark the camshaft and crankshaft gears; that is, if these gears are not already marked. This will insure the correct replacement of the camshaft after fitting the new pushrods. To mark the gears, use a prickpunch, marking a tooth of the crankshaft gear that is in mesh with the camshaft gear, and a tooth on either side of the first marked member on the camshaft gear. The work of replacing the camshaft gear will be much easier if the valves are removed.

The periphery of the flywheel bears at various points the following marks: 1-4 Up, 2-3 Up, 1-4 I-O, 1-4 I-C, 1-4 E-C, 1-4 F-C, 2-3 I-O, 2-3 I-C, 2-3 E-C, 2-3 F-C. The marks 1-4 Up mean that the pistons of the first and fourth cylinders are at top dead centre; I-O and I-C, the opening and closing points of the intake valves, and E-O and E-C, the opening and closing points of the exhaust members.

Some of these figures and letters are shown in the drawing at Fig. 4, and it will be noted that centre of the last or fourth cylinder bears a prickpunch mark, indicating centre. Rotating the flywheel in the usual direction

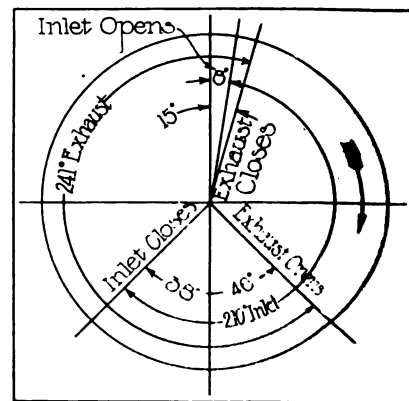


Fig. 3—Timing Diagram of Overland Motor.

of travel and until the mark 1-4 Up registers with the mark on the cylinder, will obtain top dead centre for either No. 1 or the No. 4 piston.

Revolving the flywheel about 1.25 inches will bring the mark 1-4 I-O into line with that on the cylinder. This is the approximate point at which

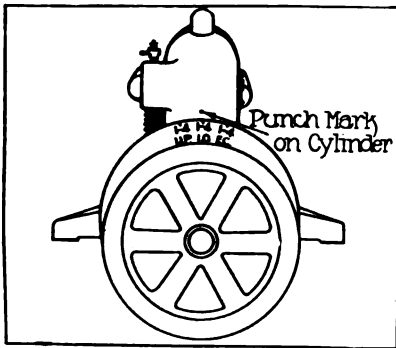


Fig. 4—Flywheel Markings on Overland Motor.

the intake valve of the first or fourth cylinder should begin to lift. This can be ascertained by further rotating the flywheel until the valve has lifted, when it will be an easy matter to note

which of the two intake members is lifting. Move the flywheel back to 1-4 mark and check up the space between the pushrod and the valve stem.

As previously explained the valve should begin to lift when the mark 1-4 registers with the centre mark on the cylinder. Adjust the valve tappet to bring about this condition. The closing of the intake valve is checked or adjusted by rotating the flywheel until the mark I-C appears, and, similarly, the other intake members and exhaust valves are checked.

The opening and closing points of the valves in inches on the 18-inch flywheel are as follows: Intake valve opens 1.25 inches late and closes 5.96875 inches late. Exhaust valve opens 7.234375 inches early and closes 2.359375 inches late.

The maker of the Overland car recommends that the pushrods be so adjusted that there is twelve-thousandths (.012) of an inch space between the top of the pushrod adjusting screw and the end of the valve stem; about space enough to insert an ordinary calling card.

Acetylene Generator—G. F. C., Madison, Conn.

Can you furnish me the address of the maker of the Rushmore Prest-O-Lite gas generator? Do you know of any acetylene gas generator that can be attached to an automobile, that generates the gas by the action of dropping the carbide into the water automatically in place of the water dripping into the carbide? If so, where is it made and who is the maker?

The Rushmore generator is the product of the Rushmore Dynamo Works, Plainfield, N. J. The Prest-O-Lite gas tank is manufactured by the Prest-O-Lite Company, Inc., Indianapolis, Ind.

The writer does not know of any generator in which the carbide is fed to the water that is adaptable to service with a motor car. It would appear that the regulation of the dropping of the carbide and of its size would involve con-

structional details which would not be practical. The usual method with automobile generators is to regulate amount of water fed to the carbide.

"The General Trend of American Motor Design" will be the subject for discussion at the March meeting of the Metropolitan section, Society of Automobile Engineers, in the rooms of the Automobile Club of America, New York City, March 26. W. M. Power, who will present a paper and open the discussion, has been with the industry from its inception and has had active experience under a variety of circumstances which is held to have fitted him to view the subject in a large way.

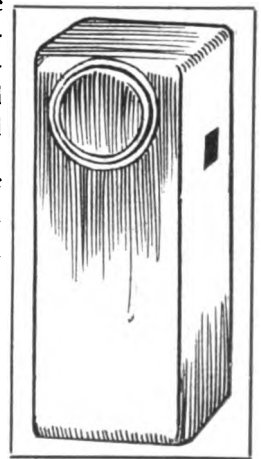
TAIL LIGHT DETECTOR.

Dash Device for Warning Driver When Rear Lamp Becomes Extinguished.

In these days, when the ordinances regulating the operation of motor vehicles are being rigidly enforced, it is economy for the motorist to comply fully with the laws. The location of the tail light is such that it requires stopping the machine, getting out and walking to the rear of the vehicle when in doubt as to whether the lamp is burning. This applies to both electric and oil units.

The Harding Specialties Company, 755 Boylston street, Boston, has perfected a device termed the Boston tail light detector, which is a compact unit, designed to be mounted on the dash in plain view of the operator, and which instantly warns the driver when the tail light becomes extinguished. This is accomplished electrically, a red semaphore showing until the trouble is corrected.

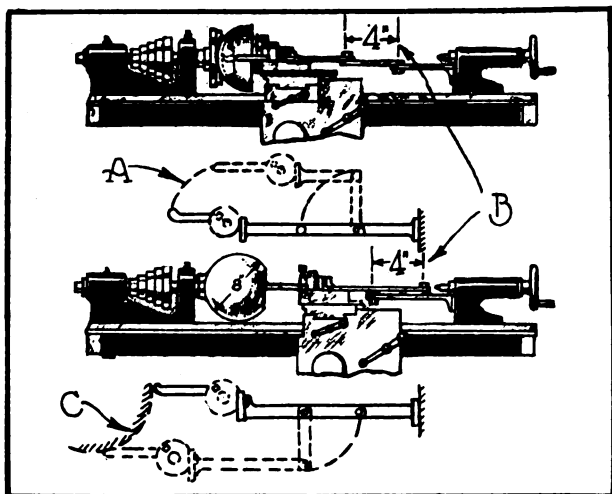
One of the qualities of the design is the ease of installation, it being stated that anyone can attach and connect it in a few minutes, and without a knowledge of electrical connections. The Boston can be used with standard lamps and can be coupled with speedometer or dash lamps without additional wiring if desired. It comes in the following finishes: Black-nickel, brass, oxidized-black and nickel. It is moderately priced.



Boston Tail Light Detector.

TURNING CONCAVE AND CONVEX SURFACES.

CONSIDERABLE ingenuity is displayed by repairmen in overcoming various machining difficulties, and an instance of a useful lathe



Device for Machining Concave and Convex Surfaces on Centre Lathe: A, Path of Cutting Tool for Ball Seating; B, Swivelling Links for Procuring Radii; C, Path of Cutting Tool for Sphere.

attachment is described in a current issue of the *Commercial Motor*, an English publication. The repairman had occasion to replace parts of a badly damaged torque tube and ball universal joint, and, when he came to turn the ball and its seating, was confronted by a problem, inasmuch as the only machine available was a 12-inch centre lathe.

An accompanying sketch shows the attachment constructed and applied, and demonstrates how the concave and convex surfaces required were turned. The upper drawing shows the attachment for turning the concave surface; the lower depicts the ball being machined. The diagram underneath each lathe illustrates the path of the cutting tool.

The inventor of the attachments states that they were constructed without trouble. They consisted of flat mild steel strips, the sections being .5 inch by one inch. Six lengths were cut off to obtain the necessary travel, and at the base of the angle pieces were drilled two .375-inch diameter holes. The plain ends were drilled out .5 inch.

The swivelling connecting rods, two in number, were drilled out and tapped .5-inch Whitworth at each end, the centres being carefully marked out equal to the radius of the ball and spherical seating; that is, four inches. Permitting these to swing at the end of each angle piece

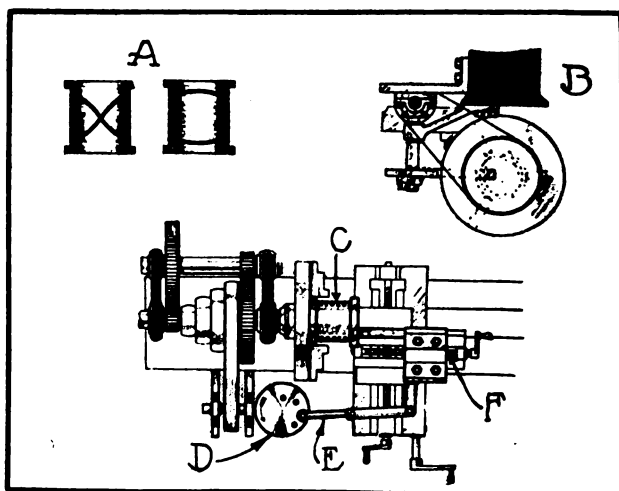
enabled the necessary arc of the cutting tool to be effected.

It will be noted that for either machining operation, one angle strip is bolted to the loose headstock of the lathe, and another piece to the top slide under the tool rest. Cross feed only is used, the transverse feed being free altogether so that without touching the handwheel the carriage may readily be pushed along the lathe bed. The cutting tool may then be made to follow the required circular path.

GROOVING OIL DUCTS ON LATHE.

Cutting in oil grooves in bearings with a chisel is not a satisfactory method and considerable time is lost in the operation. The proper method is to utilize an oil grooving machine, but these are not common in repair shops. In an accompanying illustration is presented an attachment for an ordinary lathe which the repairman who constructed the device states can be utilized to groove any size bush or bearing. The drawing is practically self-explanatory, but the chief points to be considered are that the arrangement should be bolted firmly to the lathe body and that the adjustable arm connecting the carriage with the horizontal disc should be parallel with the lathe bed at each end of its stroke.

The screw in the carriage holder must be



Attachment for Grooving Bearings on Lathe: A, Grooved Brass in Section; B, Arrangement of Drive; C, the Work Piece; D, Disc Drilled to Give Various Strokes; E, Adjustable Connecting Rod; F, Screw Which Is Removed to Allow for Free Travel.

withdrawn before commencing operations, so as to enable the carriage to slide easily in either direction. The drive must be so proportioned as

to enable the chuck to make one revolution while the tool is travelling the whole length of its stroke. An oil groove, after the outline of that shown in the small sketch, will thus be made to feed oil equally all over the bearing.

For example: Assume that a bush 1.5 inches long is to be grooved. The pin on the horizontal disc is set .625 inch out of centre; the connecting rod adjusted and the main carriage bed locked. The transverse screw is then removed

from the tool carriage and the grooving tool set about .125 inch inside the bush, and the lathe started.

The carriage being free to slide, the connecting rod will cause the tool to travel just 1.25 inches, and the gearing being so arranged that the chuck will make one revolution during the complete travel of the tool, an oil groove of the required length and pitch will be cut into the bearing.

MOTOR 'BUS AND EDUCATION.

How Widely Scattered School Districts Solved Problem of Higher Educational Advantages.

At distances varying from nine to 15 miles apart, in the vicinity of Fullerton, a prosperous town in Orange county, California, lie five school districts—Olinda, Placentia, La Habra, Randolph and Orangethorpe. Each of these districts has supported grammar schools for many years, but the problem of giving their graduates the benefit of a high school education was a very serious one. The motor truck has solved this difficulty.

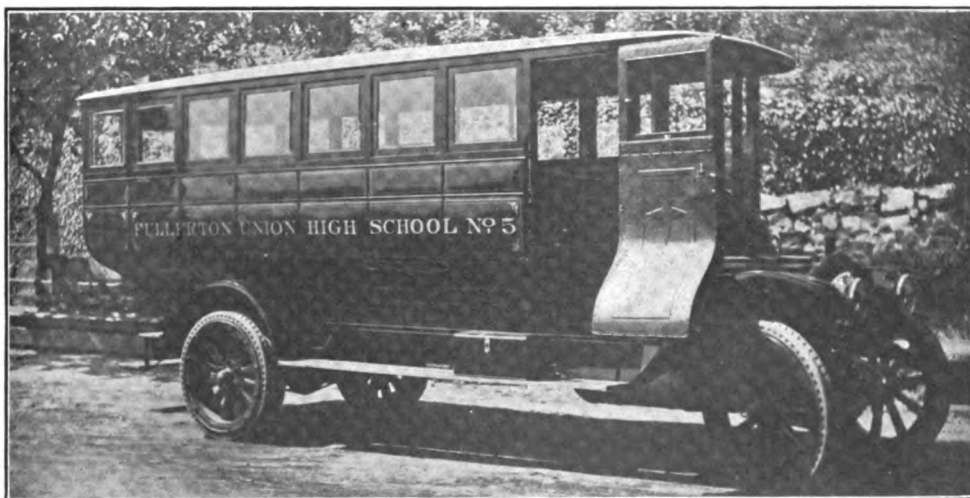
About two years ago the five outlying districts combined with Fullerton in the formation of a union high school district, and three 1.5-ton trucks, with passenger bodies, were purchased in order to transport the pupils thereto. The system worked out so satisfactorily that the high school recently added two fine new 'buses to the passenger service. More than 100 pupils, or approximately half of the enrollment, are now being conveyed between their homes and the school in these vehicles.

The motor 'bus equipment represents a total investment of \$13,700. The chauffeurs are high school boys, who take turns at the wheel, and receive 50 cents a day for their services. There is a large garage on the school grounds, and a mechanic is employed constantly to care for the trucks and keep them in good condition. Special care has been taken to provide for the com-

fort of the scholars, some of whom travel no less than 26 miles a day in the 'buses.

As a result of the concentration noted, the Fullerton union high school district has been able to erect a magnificent group of buildings. The added attendance made possible by use of the trucks has provided the school with means to engage excellent instructors and to include new courses, which are a decided advantage to the pupils.

It may be added that the operating expense of the five vehicles is borne entirely by the union



One of the Newest Motor 'Buses Acquired by the Fullerton Union High School District in California.

school district and not by the individual students. The five motor 'buses have been in constant service, making regular trips over the several routes each school day. Such work as has been necessary, apart from the daily inspection and adjustment in the school garage during the school hours, has been done on Saturdays, and the success of the experiment, in the opinion of those who have been instrumental in its inauguration, has been such as to indicate that a similar system might be adopted with profit by other districts where conditions of this nature present themselves.

MOTOR EQUIPPED FARMING IMPLEMENTS.

Some Interesting Designs Revealed at Recent Agricultural Exhibition in Paris, Including Two Plows Involving New Principles, and a Mowing Machine.

WHETHER or not it is because the agriculturists of Europe are forced to give greater consideration to the so-called intensified farming, as has been stated by prominent foreigners who have visited America, it seems true that more attention has been paid to the matter of motorized agricultural machinery on the Continent than elsewhere. About four years ago the motor plow first made its appearance at the National agricultural show in France. The progress has been somewhat rapid, as indicated by the recent display in Paris.

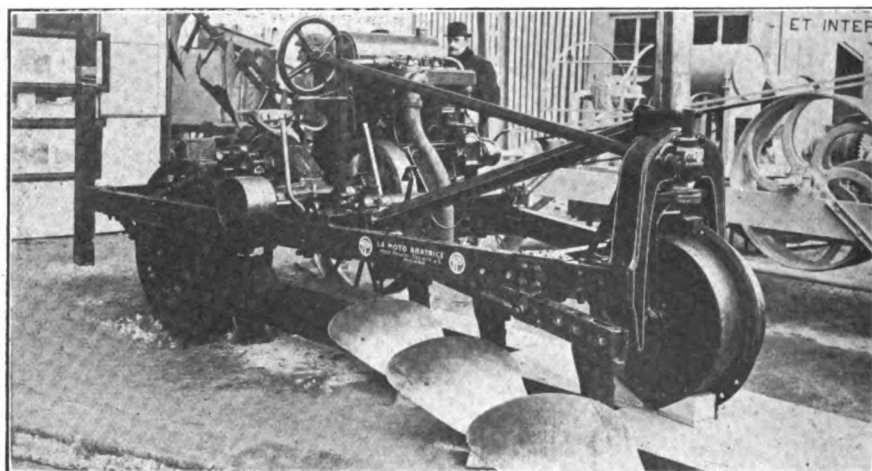
Farm machinery was exhibited in the Esplanade des Invalides, and practically all of the available space was utilized. The list of self-

One of the most interesting new machines was the Moto-Aratrice, produced by Pavesi Tolotti, 18, Via Oglio, Milan, Italy. In this an entirely new principle is involved, in that the plowshares are pushed instead of being pulled. It is made in two models, one being rated at 16-20 horsepower and the other at 40-50. The accompanying illustration is that of the smaller model.

The front of the vehicle is mounted on a single, pivoted steering wheel, which is arranged to be raised or lowered to give the desired depth of the furrow. The two-cylinder slow running motor is placed at the driver's left, who sits over the gearbox. At the outer end of the shaft extending through the gearbox is a sprocket from which final drive is by chain to the right rear wheel. In this wheel is incorporated an eccentric drum or hub, which operates 12 stout shafts connected at their outer ends to double-pronged blades pivoted between the side plates of the wheel. The eccentric action of the wheel in motion causes these blades to project in order to provide traction. After leaving the ground, the eccentric action causes them to lie flat with the tread, until they pass the top centre.

The left rear wheel is said to follow the last share in the furrow, although this is not clearly indicated by the illustration. Provision is made for lowering or raising the frame at that point to keep the vehicle in a horizontal plane, and a brass indicator shows the amount of deflection and therefore the depth of the furrow. It will be noted that the three shares are carried on a frame extension securely riveted to the right main frame member.

Another interesting machine shown was the Amiot, made by Henri Amiot, 50, Rue Lesage, Rheims, France. This is termed a combined tractor-plow, in that the share frame can be removed and the remainder of the vehicle utilized as a tractor for various purposes about the farm.



Moto Aratrice, an Italian Machine Which Pushes Plowshares Forward Instead of Pulling Them.

propelled implements included not only plows of every description, but hoes, planters, mowing machines, and nearly everything used by the farmer. Of course, there were a large number of tractors of one form and another.

Some of the machines shown have been described fully in these columns. Among these were the Stock self-contained plow, made in Germany, and the Bauche hoe, made in France, both of which have enjoyed a wide sale on the Continent, and have only recently been introduced in Great Britain. America was represented in the show by the International Harvester Company's kerosene tractor and the tractors made by J. I. Case Threshing Machine Company.

In many respects it differs decidedly from standard practise.

The motor is a four-cylinder Abeille, mounted at the forward end under a hood, with the radiator in front and the fuel tank at the rear. This is rated at 40 horsepower. Drive is practically direct, there being only one speed either forward or backward, and power is transmitted to the 70-inch rear wheels by side chains.

A feature of the machine is the provision for turning the furrow either to the right or left, thereby making it unnecessary to go around the entire plot. A strong rigid frame at the rear carries six plowshares, three being above and three below, as shown in the accompanying illustration. Above this is a crane like girder, carrying a pulley at its outer end, over which is led a chain, by means of which the plowshare frame is hoisted and lowered, by the engine's power.

At the forward end of the plowshare frame is a train of gears, also operated by the motor, by means of which this frame may be rotated so as to bring either set of shares into action. This frame also is made detachable by removing two bolts. A yoke is then substituted, converting the forward portion of the machine into a tractor.

Among the mowing machines shown was an entirely new model, produced by S. Plissonnier, 234, Cours Lafayette, Lyons, France. The construction involves

the use of a long frame, with a 6-8 horsepower motor mounted at the front, over a single pivoted wheel. The fuel tank is carried on a light support directly over the radiator, feed being by gravity. Power is transmitted by cone clutch and a gearset, affording but one speed forward and reverse, to the rear axle.

The operator is located well back of the rear axle, steering being by a vertical column, connected by suitable linkage to the pivoted front wheel. The cutter bar can be raised or lowered by a long lever at the operator's right, this being arranged to automatically engage a special clutch for placing the knives into and out of action. The appearance is very neat and the construction is such as to permit of easy operation.

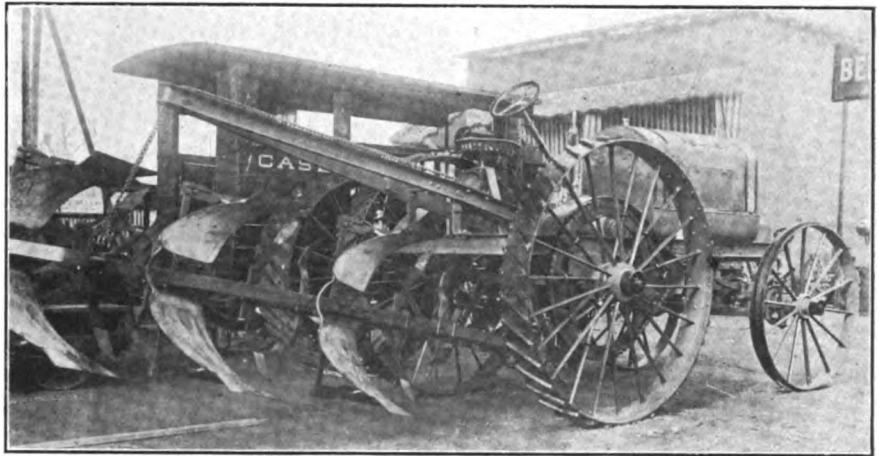
Of the 33 cars which started in this year's tour de France, 22 were equipped with Bosch ignition.

PAIGE FOR ARMY MAN.

Detroit Maker Secures the Order in Competition with Five Other Concerns.

Whenever a motor car manufacturer is enabled to place one of his machines with the United States government, he feels that he is entitled to congratulations for himself and his product. Therefore, the Paige-Detroit Motor Car Company, Detroit, takes pardonable pride in announcing that it has just delivered a model 36 Page roadster, to Lieut. Kenney, Chicago, recruiting officer for the United States army in that district.

Six cars competed for the sale. The complete specifications and analysis of the materials used in these cars were sent to the Secretary of War at Washington, and the selection was made after



Amlot Combined Plow and Tractor, Indicating Novel Arrangement of Plowshare Frame.

due consideration of all the details thus supplied.

AFTER MOTORCYCLE BUSINESS.

Goodyear Company Expects to Produce 190,000 Tires of This Type in 1914.

According to S. A. Falor, manager of the motorcycle tire department of the Goodyear Tire & Rubber Company, Akron, O., that company is well squared away for the largest motorcycle tire business in its history. In the three years, 1911, 1912 and 1913, this company made and sold 250,000 tires of this type, but it expects to produce 190,000 this year alone.

Mr. Falor adds that the company has added 50 per cent. to the durability of the rubber in the tread stock, to compensate for the heavier loads which motorcycles are carrying.

WHITE SYSTEM OF MOTOR LUBRICATION.

THE White system of motor lubrication, the invention of Ernest M. White, a consulting engineer of Globe, Ariz., who is now located in Detroit, Mich., has been recently brought to the attention of automobile motor engineers, who have manifested much interest in it. The system is a construction of the crankcase internally so as to provide for a progressive feed of the lubricant to each of the big ends of the connecting rods so that the splash flowage will be uniform in every condition in which the engine is used. As the statement would indicate, this is an application of splash lubrication.

The majority of motors in use today are lubricated by a distribution of oil internally in the en-

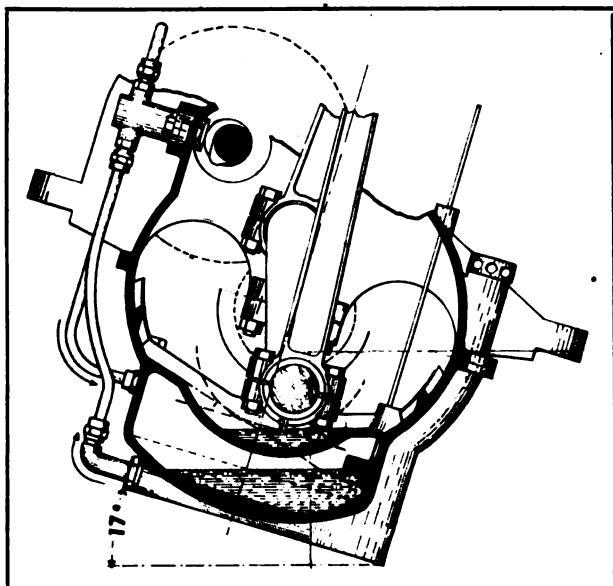
ance, for the main, crankpin, wristpin, camshaft and timing gear bearings, the piston and cylinder walls and the valve tappets and guides, as well as the timing gear faces and the valve cams, must be oiled.

It is evident that an excess of lubricant will not be a reason for objection unless there is an accumulation in the combustion heads of the cylinders, but a volume insufficient will quickly result in damage, and the necessity of supplying the forward portion of the motor when ascending a grade and the engine is worked the hardest has impelled the combination of a mechanical feed that will insure a supply being carried to the timing gears and forward main bearing.

The splash system is primarily the dipping of the big ends of the connecting rods into pits or gutters made transversely in the web, forming the bottom of the crankcase in which oil is collected as it drains from the walls of the case. As the motor heats the fluidity of the lubricant is increased and it flows more rapidly, but the need of the engine is greater and the distribution is faster. As the volume of oil lessens the quantity available for hard or fast work is consequently diminished, and while there might have been excess for slow operation there is not sufficient for continued use at fast speed. If the source of supply is variable with the position of the engine, with reference to the grade, mechanical feed is expected to furnish oil to those parts where the least quantity is supplied. Theoretically, the rapid revolution of the connecting rods is supposed to create a mist of oil in the crank chamber, and this should be distributed by centrifugal force. It will be understood that considerable depends upon the state of the fluidity of the lubricant.

The claim is made for the White system that the volume of oil splashed from the oil pits about the engine case is the same for all motor speeds, no matter whether the motor be level or placed at an inclination of 25 degrees above or below the horizontal, which is equivalent to ascending or descending a 46 per cent. grade. It will be understood that this is a gradient that is extreme, for operation in a condition that would equal this would not be regarded as practical by any experienced motor operator.

The specific value of the system is that it insures a constant supply of oil at all times, whereas in other methods of lubrication the oil is concentrated at varying places in the pits or pools and not where the fullest supply is afforded to



Transverse Section of Motor with White Oiling System at Angle of 17 Degrees, Showing Oil in Reservoir and Crank Pits, and the Location of the Drainage Channels at the Sides.

gine, this method being regarded by most engineers as being satisfactorily efficient, and is applied because conditions generally establish its practicability. The ease of construction, simplicity and the certainty of operation are also factors that have impelled engineers to utilize this method, although some have adapted combinations which are regarded as productive of specific results.

Motor lubrication is dependent upon varying conditions and each moving part ought to be supplied a sufficient volume of oil to meet every requirement, this with reference to temperature, speed and quantity of lubricant contained in the supply, these factors being of decided import-

the scoops attached to the big ends of the connecting rods. When baffle walls or separate troughs are provided the quantity in each may vary considerably, some of the cylinders being "starved" and others flooded when the grades are extreme. Operation in such conditions may result in serious damage to a motor.

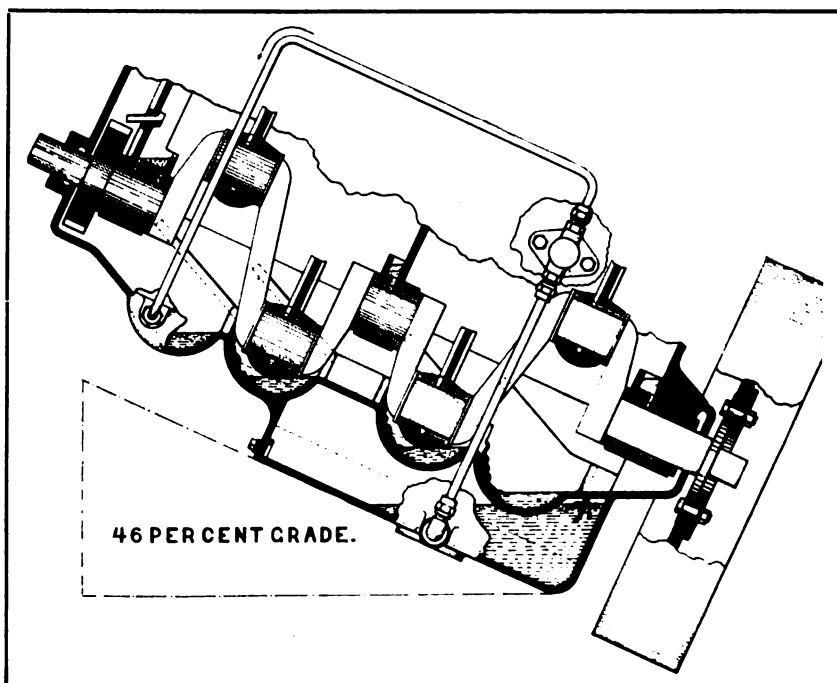
The White oiling system is shown in a sketch of a longitudinal section of a crankcase and illustrates the peculiar form of the splash troughs and the "dippers" on the connecting rods, as well as the oil level in the troughs when the motor is inclined, as when climbing a gradient equivalent to 46 per cent. This indicates the possibilities in circumstances that would probably never be reached. This sketch assumes that the surface is level transversely, but the other shows a transverse section and the surface of the oil in the pits with the motor inclined 17 degrees. From these two one will gain a very clear idea of the manner in which the oil is concentrated and retained, where it can always be utilized.

The oil may be contained in any convenient form of reservoir attached to hose of crankcase, from which it may be drawn by any suitable type of pump, fed through a sight feed if desired, and then delivered, either over the timing gears or to the splash trough for the front or No. 1 cylinder. As will be noted, on the side walls of the crankcase are grooves or channels that are sufficiently inclined to insure a flow of the oil drained from the walls toward the rear of each of the oil pits or troughs, but draining into the trough behind.

Examining the second sketch one will see that the oil carried forward by the pump is drained into No. 1 trough. Here it is splashed transversely across the case and distributed centrifugally, and after lubricating this section and the working parts the drainage is collected in the side channels and carried to No. 2 trough. The operation is repeated to the last trough, and the drainage from this is into the oil reservoir. The pump is adjusted to give a stated quantity each revolution, and thus the drainage is collected progressively and an equal volume of oil supplied each trough, no matter what the number of cylinders. Each trough is abundantly provided for, and no

one will receive more than another, for the movement of the oil is specifically directed. The flow of oil from the front splash trough to the rear of the motors is illustrated, the oil being represented by what might be mistaken for wicks.

The inventor claims that besides definite efficiency the simplicity and low cost are material factors. When installed when a motor is built the cost is no greater than that of the simplest system, using a pump or the flywheel to lift the oil from the oil sump to the splash troughs. The uniform distribution of lubricants under all operating conditions is maintained to be especially desirable for practically every form of motor used for motor vehicles, motor yacht or aeronautical purposes. The inventor maintains that the sys-



Longitudinal Section of Motor with White Oiling System at Angle of 25 Degrees, Showing Form of Crank Pits and Their Retention of Oil, the Dotted Line Indicating Bottom of Drainage Channels.

tem has been thoroughly tested on long and heavy grades in the mountains of Arizona, being installed in four and six-cylinder motors of different makes, and that the efficiency and uniformity of the lubrication gave marked increase of mileage to the gallon of fuel, no smoke was exhausted and the motors ran cool and had as much power at the top of a long grade as when the start was made.

The annual Springfield automobile show and industrial exposition will be held in the Auditorium, Springfield, Mass., March 28-April 7, at which all the local dealers will be represented.

GIBAUD MAGNETO HAS NOVEL FEATURES.

A MAGNETO which presents interesting features, in that its maker has departed from conventional practise, is the Gibaud, a French design, which is now being made in England under patent rights. The instrument is very compact and follows usual practise in general design, consisting as it does of a laminated

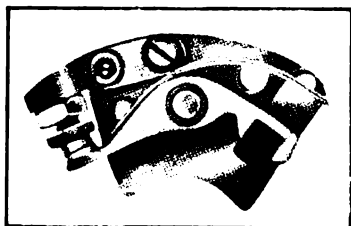


Fig. 1—Gibaud Contact Breaker.

ated H section armature and horseshoe magnets of the permanent type. It is a true high-tension magneto, the armature carrying a coarse and a fine winding.

The contact breaker or mechanism utilized for interrupting the primary current, and the method of obtaining the required reduction in speed between the armature shaft and the distributor are novel. By referring to Fig. 2 it will be seen that the circuit breaker mechanism, which is depicted at Fig. 1, is located inside the armature tunnel, and that the distributor is placed at the end of the armature shaft, a position generally occupied by the circuit breaker mechanism and its housing.

The contact breaker comprises a base plate to which is attached the fixed platinum contact point. The other point follows general practise, in that it is removable, being mounted on a rocker arm having a fibre block. The entire construction is attached to the end flange of the armature and revolves with it. The stationary cam, which causes the points to separate, is mounted on the end plate casing in such manner that it can be partially rotated to obtain the usual advance and retard features.

Accessibility and ease of adjustment of the interrupter are features. By displacing a cover plate, shown at Fig. 2, the breaker mechanism is visible, and by releasing a spring catch, the breaker and base plate will practically remove themselves. This makes it a simple matter to clean and adjust the contact points.

The distributor is very compact. It resembles somewhat the type utilized by the maker of the Bosch magnetos, and the segments are imbedded in non-conducting material. Instead of employing a gear on the armature shaft and meshing it with a larger gear on the distributor, bevel gears are utilized, somewhat in the same

manner as a differential on a motor car. A crown bevel gear is mounted on the extremity of the armature shaft, and a similar member is immovably fitted to the casing of the magneto. Between these gears and meshed with them, is a pinion gear, carried as it were on a radial shaft, one end of which encircles the armature shaft, and is supported by the latter through a ball bearing.

The reduction necessary is obtained by the pinion gear being carried around the armature spindle 180 degrees to a complete revolution of the armature shaft, or, in other words, the small member makes one revolution to two of the armature shaft, thereby obtaining the desired reduction.

The distributor is displaced easily when desired by springing out two springs as shown. A construction resembling that utilized on the Bosch ZR types of magnetos.

FINDS BUSINESS GOOD.

Miller Tire Official Predicts Best Year of Industry's History in the South.

F. C. Millhof, sales manager for the Miller Rubber Company, Akron, O., maker of Miller tires, recently returned to the factory after an extensive trip through the South, visiting Atlanta, Savannah, Jacksonville and Tampa in the East, and points as far west as Little Rock, Ark. He reports that optimistic conditions prevail throughout the entire district, and predicts that 1914 will show the biggest year of the industry's history in the South. He also found that the Miller tire is well known in that section.

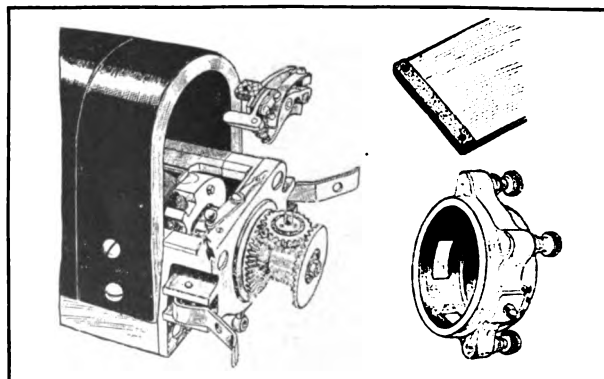


Fig. 2—Illustrating General Arrangement of Gibaud Magneto: Right, Vulcanite Distributor Casing and Armature Cover; Left, the Bevel Gear Distributor Mechanism—The Arrow Shows the Cam, Also Lever Employed to Obtain Variable Ignition.

F. R. A. M. ELECTRIC FRONT DRIVE TRUCK.

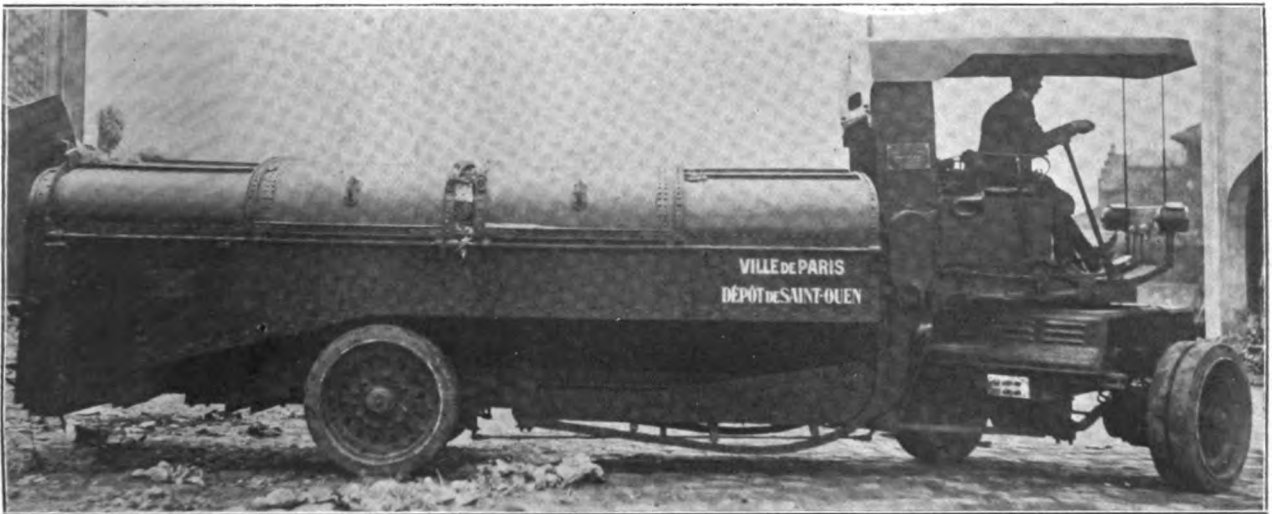
Constructional Details of Interesting French Machine, One Hundred of Which Have Been Purchased by Paris Municipal Officials for Varying Service.

BECAUSE of the increasing use of electric vehicles abroad, particularly by municipal authorities, etc., some consideration of the F. R. A. M. five-ton model, built in the De Dion-Bouton works, Paris, France, will prove of interest. This is especially true, since within the past few weeks the maker has invaded Great Britain with this machine, and it is not improbable that some effort will be made to introduce it in America.

Accompanying illustrations present some of the details of construction, particularly the substantial lines of the chassis. Of course, following the practise generally obtaining abroad, the bodies are built to specifications, and that shown herewith is utilized by the municipal authorities

and recoil springs, each motor driving one forward wheel, independently of the other, through double reduction spur gearing to gear wheels bolted to the inside of the road wheels. This construction is brought out partially in one of the smaller illustrations, although, since the whole arrangement is suitably enclosed, it is impossible to note the details employed.

The battery is of 44 cells carried in trays, six of which are located on the fore carriage directly above the motors, fully protected by a removable hood, which also provides for easy access to them whenever necessity requires. It will be understood that this fore carriage is fitted on a pivot so that it is possible to swing the road wheels



Five-Ton F. R. A. M. Electric Truck, Made in De Dion-Bouton Factory and Fitted with Specially Designed Body, in Service with Paris Municipal Authorities.

in Paris for the collection of refuse—street sweepings, etc. It is understood that 100 of these vehicles have been purchased by the officials of that city for various purposes.

It may be added that the type was first produced in the three-ton capacity, and vehicles of this weight have been in service in France for a matter of a year. The newer five-ton model is identical in design, although, of course, the construction differs, in that the components are made somewhat stronger to take care of the additional load.

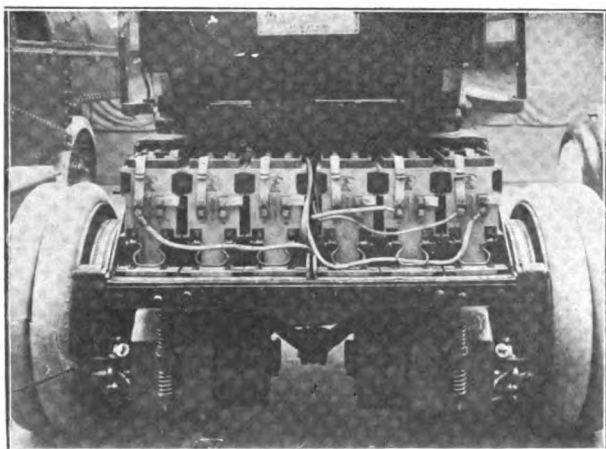
Two seven-horsepower compound wound motors are suspended from the fore carriage by coil

in such manner that either or both sides, or ends, of the hood may be raised at will. This is still further indicated by the illustration, which shows one portion of the hood removed, and the cells exposed. The remainder of the battery, consisting of three trays, is placed under the driver's seat, where it is equally as accessible.

This battery is rated at 350 ampere-hours, with a mileage of from 25 to 30. It is stated, however, that when the vehicle is going down grade it is possible to make use of the motors as braking dynamos, generating current which is returned to the battery as an extra charge. The amount of this extra charge is dependent, of

course, upon the character of the locality in which the vehicle is worked.

Five forward speeds and one reverse are pro-



Front View of Five-Ton F. R. A. M. Electric Truck, Showing Battery Trays Exposed for Removal—Note Enclosed Motors Driving Front Wheels.

vided, and these are controlled by a vertical lever located at the driver's left. The average maximum speed for which the machine is geared is about 7.5 miles an hour.

Steering is by a combination of worm and bevel gear, and the vehicle, which has a wheel-base of 168 inches, has a turning circle of 33 feet. An interesting feature in this connection is that, when turning sharply, contacts automatically put more cells into circuit with one motor than the other, thereby speeding up the outer wheel.

The maker of the F. R. A. M. has taken into consideration the fact that a vehicle of this type should be available for a wide variety of service, and suitable provision has been made for fitting detachable bodies. The body shown has, as has been stated, been used in Paris for the collection and disposal of refuse. This has been designed with the idea of preventing dust and litter from being blown about the street, and the various compartments are provided with separate covers, two opening from one side and two from the other. It may be added that the division of the sliding cover is four feet eight inches from the ground, facilitating loading.

These compartments open into each other, virtually making but one, so that the vehicle is readily dumped at the rear. One of the smaller illustrations presents an attendant in the act of dumping a load, this being accomplished by means of a hand operated winch, which draws the bottom end of a steel arm on either side along a curved track, forcing the forward end of the body to a suitable angle for discharging the load.

A winch is provided on each side, so that two men may expedite the work.

It should be added that the chassis is fitted with dual tires, both front and rear. The weight of the body shown is approximately two tons. Attention also may be drawn to the fact that with the provision for easy access to the battery trays, it is held to be possible to make a complete change of battery in 10 minutes. This is considered a decided advantage in municipal work, since it has frequently been the case in Paris, that a vehicle has been required to cover some 20 or 25 miles in the morning, returning to the garage at noon for a change of battery and performing a like service in the afternoon.

AUTOMOBILES EXCLUSIVELY.

Horses Are Entirely Eliminated at Panama-Pacific Exposition Grounds.

For the first time in the history of international expositions, or world's fairs, motor trucks are being used to haul the material used in construction work in connection with the preparations for the Panama-Pacific exposition in San Francisco, Cal., in 1915. A horse would prove a decided curiosity on the grounds, as in every instance automobiles are being utilized.

Incidentally, it may be remarked that this work is proving of decided importance as an object lesson to San Francisco business men. Few cities of the country have such steep hills, and yet the motor trucks have been able to negotiate



Indicating Method of Operating Dumping Mechanism on F. R. A. M. Machine Utilized by Paris Officials.

them without difficulty. The rapidity with which the preparation work has progressed is held to be due very largely to their use.

INSURANCE AGAINST THEFT.

Gasolock Controls Fuel Supply, Preventing Operation Except by Holder of Key.

In spite of the severe penalties prescribed for the use of cars by others than those having the right to operate them, the list of machines reported stolen is rapidly increasing, and a large number of cars have practically disappeared, so clever are the bands of organized automobile thieves. As a result many owners are now carrying insurance who formerly did not deem the precaution necessary.

The Headlight Support Company, Dime Bank building, Detroit, is manufacturing the Gasolock, which is held to eliminate the need of insurance, in that it shuts off and locks the fuel supply, one of the most practical methods of locking a machine. One of the qualities of the device is that it is easily and quickly operated from the seat. By turning a thumb button the supply of gasoline to the carburetor is shut off and locked until the owner of the key releases the mechanism by means of a Yale key, no two of which are alike.

The Gasolock presents several other practical features. It prevents waste of fuel through a flooding carburetor, and in the event of the latter catching fire because of a backfire, the supply of fuel can instantly be shut off, preventing a serious loss. As the thumb button is convenient the fuel supply may be closed and locked, and without having to stoop and search for petcocks, etc.

The Gasolock is not only neat and compact, but is nicely finished. Nickel and brass are standard and its installation is a simple matter. Two Yale keys are supplied with each lock and the third is kept by the company, filed away with the owner's number, so that in case both keys are lost a wire or letter will bring the extra key without charge and by special delivery.

The Gasolock is not only guaranteed for life, but it can be installed on any car and used over again. It is moderately priced and its cost will pay for the usual insurance. It also is adaptable to motor boats, motorcycles and cyclecars.

FOURTEEN ENTRIES NOW.

Expected That There Will Be at Least 30 Starters in This Year's 500-Mile Race.

Although there are but 14 actual entries for the fourth annual international sweepstakes 500-

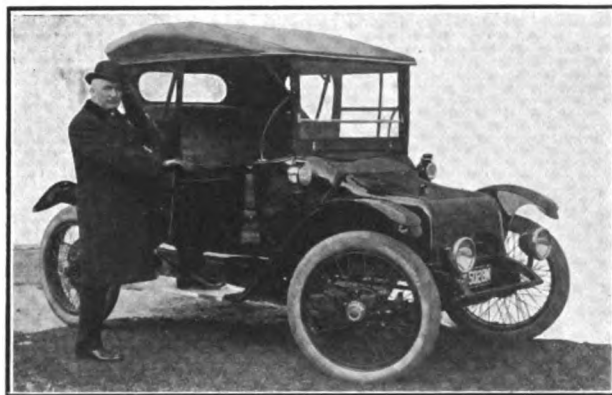
mile race on the Indianapolis speedway, Memorial Day, it is expected that not less than 30 cars will start. A number of other machines are known to be certain entrants.

The list reads as follows: Stutz, Anderson; Stutz, Cooper; Burman, Burman; Burman, unknown; Gray Fox, Wilcox; Bullet, Keene; Peugeot, Goux; Peugeot, Boillot; Sunbeam, Chasagne; Delage, Guyot; Excelsior, Christiaens; Peugeot, Duray; King, Klein; Delage, Thomas.

USES ELECTRIC ROADSTER.

Well Known Detroit Manufacturer Thinks Others Will Soon Follow His Example.

An accompanying illustration presents W. C. Anderson, president of the Anderson Electric Car Company, Detroit, maker of the Detroit electric line of pleasure cars and trucks, and the De-



W. C. Anderson, President, Anderson Electric Car Company, and His Detroit Electric Roadster.

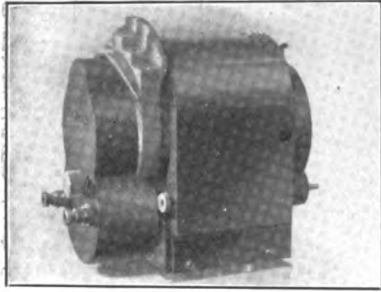
troit electric roadster, which he drives every day of the year, regardless of weather conditions. Mr. Anderson is often spoken of as "The youngest man about the factory", and he declares that the secret lies in his policy of: "Don't worry, eat simple food and keep out of doors as much as possible".

Mr. Anderson drives the car himself, for, as he puts it, he has no time to wait for a chauffeur to get ready to start. Neither has he any patience with the housed-up business man who misses an opportunity for a breath of fresh air en route to and from his office, by allowing himself to be driven about in a closed car. He prophesies that when the pleasure and healthful recreation, as well as the flexibility of the electric roadster, is better understood by the average business man, the electric car will predominate for his city requirements.

MECHANICAL NOTES FOR OWNERS.

Operation of Briggs Magneto and Wiring Plan for Four-Cylinder Motors---Home Made Clutch Pedal Pad---Timing Overhead Valves---Care of Batteries.

OWNERS who care for their machines should have at least a working knowledge of the operation of the ignition system with



Briggs Model A Magneto.

which the car is equipped and should keep in the garage or on the vehicle a copy of the wiring plan, so that in the event of trouble corrections may be made. This applies particular-

ly to the low-tension type of magneto which utilizes a transformer or step-up coil for building up the primary current generated by the instrument, and which employs batteries for starting or for an auxiliary source of current supply.

The Briggs magneto, made by the Briggs Magneto Company, Elkhart, Ind., which is standard equipment on 1913 and 1914 cars, is a low-tension instrument, in that the armature core has a single winding of coarse wire. The transformer coil is carried separately on the dash under the hood, the switch being located on the driver's side.

In an accompanying illustration is presented the wiring plan of the magneto and it will be noted that there are five high-tension leads with a four-cylinder instrument, these including four to the plugs and one conveying the built-up current from the coil to the distributor. The terminal of the last named is the centre member just forward of the others.

The battery current is not grounded. Both the positive and negative leads are attached to the upper right hand terminals marked "bat" in the drawing. The transformed current is led from the extreme left hand upper terminal to the distributor and it is important that the connections be clean and tight, as

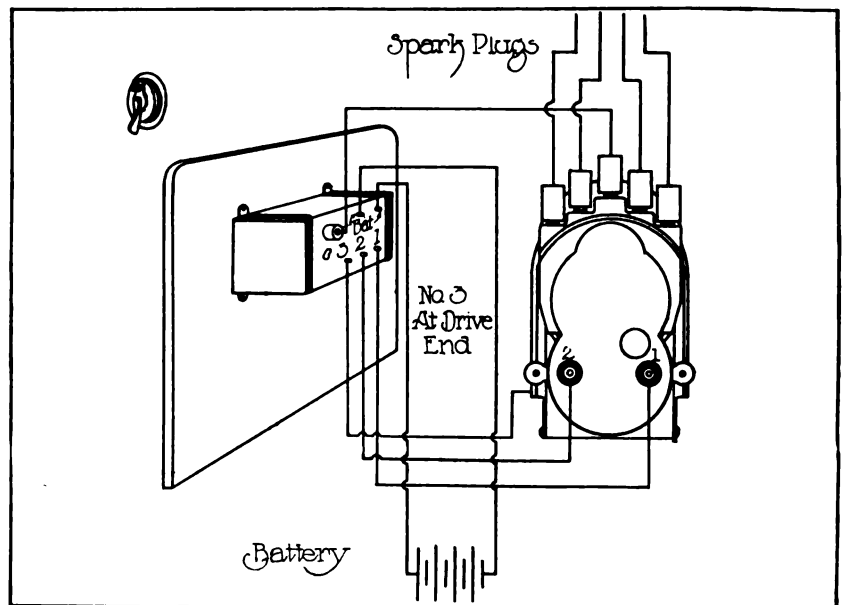
high-tension current flows through this wire irrespective of whether the source of current supply is the cells or the magneto.

The balance of the wiring plan comprises three primary leads, and as these are marked 1, 2 and 3 in the drawing, it should be a simple matter to memorize their order. The Briggs instrument is automatically lubricated, the maker stating that the supply is sufficient for 15,000 miles of service.

CLUTCH PEDAL PAD.

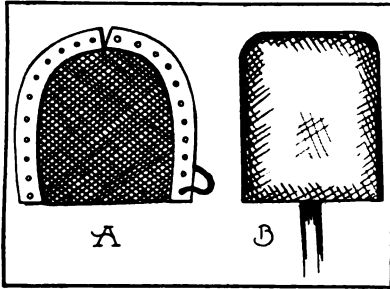
The manufacturer of the modern machine has refined many details so as to contribute to ease of operation and provide a large factor of safety. Among these is the clutch pedal. Formerly, little attention was given these members other than corrugating the pedal proper. After considerable service the surface becomes smooth, sometimes resulting in the foot slipping when quickly applied.

The following suggestion for fitting the clutch pedal with friction material is made by a reader and the plan could be utilized with the brake member: Take an old pair of rubber soled tennis shoes, not too badly worn, and cut off the heels with their uppers. Punch some holes in



Wiring Diagram of Four-Cylinder Briggs Magneto, a Low-Tension Instrument Using Dash Type Transformer Coil.

the cloth section as shown at A in an accompanying illustration, also a slot to permit of the material being laced snugly around the pedal. By



Home Made Clutch Pedal Pad.

utilizing a stout lacing the material can be so secured as to make a pad as shown at B.

The contributor states that while the job is not as

attractive as the marketed pads, it is very serviceable, costs nothing to make and is easily fitted. He also suggests the possibility of securing a tennis shoe that is in very good condition.

TIMING OVERHEAD VALVES.

The majority of owners prefer to rely upon the expert when it becomes necessary to retime the valves of a motor, but there are a large number of motorists who are very proficient in the work and for their benefit the following discussion of timing valves of the overhead or rocker type, contributed by a repairman, is presented:

It should be borne in mind that the opening and closing of the various valves has much to do with the balancing of an engine, and that often excessive vibration is due to a variance in the opening and closing points of the valves.

The method adopted includes disassembling the motor and utilizing the crankshaft, flywheel and upper half of the crankcase. The last named is placed on a level surface and sufficiently high to clear the flywheel, as shown in an accompanying illustration. The crankshaft is then rotated until the crankthrows of the first and fourth cylinders are exactly on top dead centre. This position is obtained by means of a square held to the side of the crank web and a spirit level placed on the top of the blade. Having obtained this position, a pointer, constructed of a piece of tin, is placed on the centre of the crankcase as shown, and so located that its point will overlap the flywheel. A line is then scribed on the flywheel, which indicates top dead centre.

The flywheel is then rotated a half turn, or until the throws on the second and third cylinders are on top, and the exact vertical position is obtained by means of the square and the level. The flywheel is also marked. The cylinders are next replaced and other parts of the motor re-assembled.

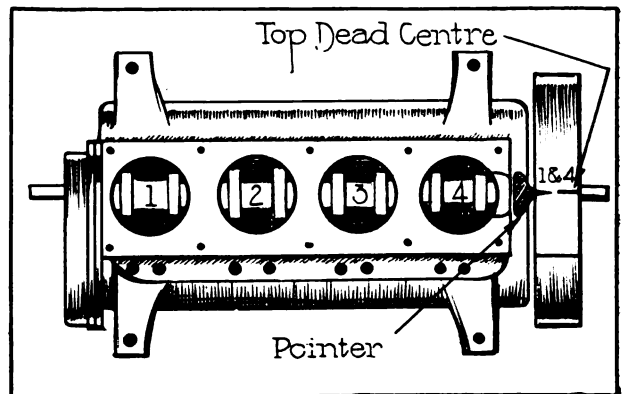
The crankshaft is then rotated until the exhaust valve of the No. 1 cylinder closes. This should take place shortly after dead centre. A chalk mark is then placed on the flywheel opposite the pointer, and the flywheel turned until the No. 4 exhaust closes, when the flywheel should again be marked where the pointer overlaps.

Any difference between the timing of the No. 1 and No. 4 markings, with relation to the pointer, can be altered by turning the camshaft backward or forward one or two teeth as required. The No. 1 and No. 4 intake valves are treated in a similar manner, and with a little adjustment of the tappets, the intake valves referred to will fall in with the correct timing of the motor. The position of the valves should be taken both open and closed.

DRY CELLS AND STARTING.

The number of motorists who do not use their machines during the winter months is steadily decreasing. Those who have stored their cars, and who are not familiar with batteries, either the storage or the dry cell, will do well to give these members attention before attempting to start the motor for the first time in the spring.

Dry cells deteriorate with age. This applies to those which were practically new when the car was put away, and it is rare that the average make of dry cells will show sufficient amperage to warrant their use after they have been standing for two or three months. It is possible that readings with an ammeter will show eight or 10 amperes, and, while it might be possible to start the engine on these, it is only a



Timing Motor with Overhead or Rocker Type Valves by Utilizing Crankthrows.

question of time when the output of the batteries would be so reduced that starting troubles would be experienced.

In placing the machine in commission it is best to throw away the old cells even if they show 10 amperes, for it should be borne in mind that with the present grade of fuel a good, hot spark is more essential than when higher test gasoline was marketed.

If it be found that one or two of the cells test, say 12 amperes for example, it is not good practice to retain these and add four new ones in an endeavor to economize. It is of no use to cut in new cells with old ones in series as the resistance of the latter is very high. If three old cells were to be added to three new ones, the latter would have to work through the high resistance of the dried up elements of the old ones. This explains why it is sometimes possible for the expert to take an apparently exhausted set of cells and by throwing out one or two obtain sufficient current to operate the car temporarily.

In wiring a set of new cells, either in series or multiple series, the terminals should be set up snugly, and, after the car has been in service a short time, the terminals should be gone over and retightened. Much of the trouble in starting is due to a loose connection which sets up a high resistance to the passage of current from the other batteries. In installing the new cells, make sure that none of the wires leading from the battery box come in contact with any sharp metal corners. When the leads are in proximity to metal, tape the wire. Cells should be so installed that they cannot bounce around in the container. It is a simple matter to pack them with paper, and in placing them in the box locate them so that terminals will not be in contact or near each other. In testing cells the ammeter should be kept in the circuit long enough to obtain a true reading; that is, until the indicating hand comes to a stop.

If the storage battery has been properly cared for, and in accordance to the instructions of the maker, all that it will need will be recharging, and this is best done by the battery expert, who will determine whether or not it requires a long, slow charge. The writer recommends taking the battery to the expert, as it will insure satisfactory service after replacing it in the machine. It is also possible that it may need some slight attention that would naturally be overlooked by the owner.

H. J. Galvin, who has been with the Remy Electric Company, Anderson, Ind., for a number of years, and is well known to the trade in the East, has been appointed manager of the San Francisco branch of the company.

AS TO PRICE CUTTING.

Detroit Electric Official Discusses the Subject from Viewpoint of His Company.

Recently the Anderson Electric Car Company, Detroit, maker of Detroit electric machines, created unusual interest by advertising in the Chicago newspapers that it would pay \$1000 in cash to anyone who could purchase or cause to be purchased from the company in that city a new 1914 Detroit electric at any time during the 1914 season at less than the regular, established prices. In commenting upon the situation, D. E. Whipple, an official of the company, states that this was merely a public announcement of a policy long followed by this concern. He adds:

People are gradually coming to realize that they do not gain anything by buying an article which has been purposely given a high list price in order to permit the dealer to "throw off" something to the purchaser. In determining the selling price of an automobile, or any other article, the manufacturer first arrives at his manufacturing cost, and that cost is absolutely determined by quality, volume and manufacturing facilities. When that cost has been determined, the selling price is then fixed by adding to the cost such profit as the manufacturer expects to realize.

The original selling price of an automobile or other article that is sold at a discount must of necessity have been purposely fixed high in order to permit of price cutting. The buyer of such an article may be led to believe that the cut or discount is strictly personal and confidential, but if he stops to think he will ask himself: "Why should I be allowed to buy this thing cheaper than anyone else?" And then will come the questions: "Am I getting the lowest price, after all?" "How do I know that someone else is not getting an even larger discount than I?"

Price cutting is coming to be recognized as one of the worst evils in business. It is not only bad for the manufacturers and dealers—it is even worse for the purchaser, for the manufacturer who will cut the price is not unlikely to shade quality to correspond.

The only sound way of doing business is to have a fair, honest price and stick to it. That is the practice in all the old established lines of business. Some day it will be the universal rule in the automobile business. The only reason that the evil of price cutting has ever crept into the motor car industry is because it is a new business and has to pass through certain evolutionary stages. But the stronger concerns, the ones whose methods and products can be depended upon, are taking a definite stand in favor of price maintenance—and wise purchasers realize that such a policy is of the greatest protection and benefit to them.

Vulcan Touring Car Sells for \$850—In the two-page advertisement of the Vulcan Manufacturing Company, Painesville, O., appearing in the March 10 issue of *The Automobile Journal*, the caption under the cut of the Vulcan touring car inadvertently omitted. This should have read: read: "Vulcan touring car, five-passenger, 115-inch wheelbase, electric lights, \$850".

The first run of the Cyclecar Club of New England, formed during the recent Boston automobile show, will be held Memorial Day.

SPECIALLY DESIGNED MUNICIPAL WAGONS.

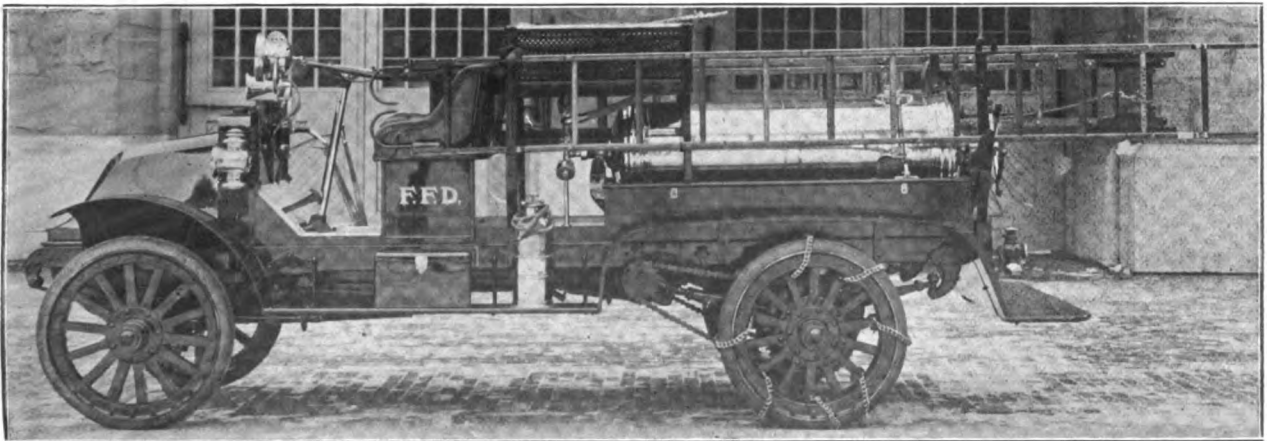
Indicating the Manner in Which Department Officials and Motor Car Manufacturers Have Co-Operated in an Endeavor to Meet the Needs of Public Service.

PERHAPS no one field offers greater possibilities for the maker of motor vehicles than that which may be termed municipal service. Obviously, in its broadest sense this term must be applied to the transportation needs of any and every department, but, as generally applied, it has particular reference to fire and police apparatus. Insofar as the needs of any department, such as that of streets for example, are identical with those of business men engaged in similar work, the trucks available for this purpose cannot well be classified as municipal service vehicles. A truck equipped with dumping body engaged in carting grading material for the city is no different from a truck of the same make fitted with the same type of body in

the space allotted in this instance, and it is significant that fire department officials have co-operated most exhaustively with automobile manufacturers in an effort to secure greater efficiency. This applies particularly to the gasoline pumping engine.

Fire and Police Work.

The matter of first cost occupies the largest interest on the part of municipal authorities and the tax payers, since it can readily be demonstrated that motor equipment is more economical and many times more efficient than horses. It may be conceded that the automobile is a source of expense only when in use; it eats nothing while standing in the station. Less room is required for storage; consequently, it costs less



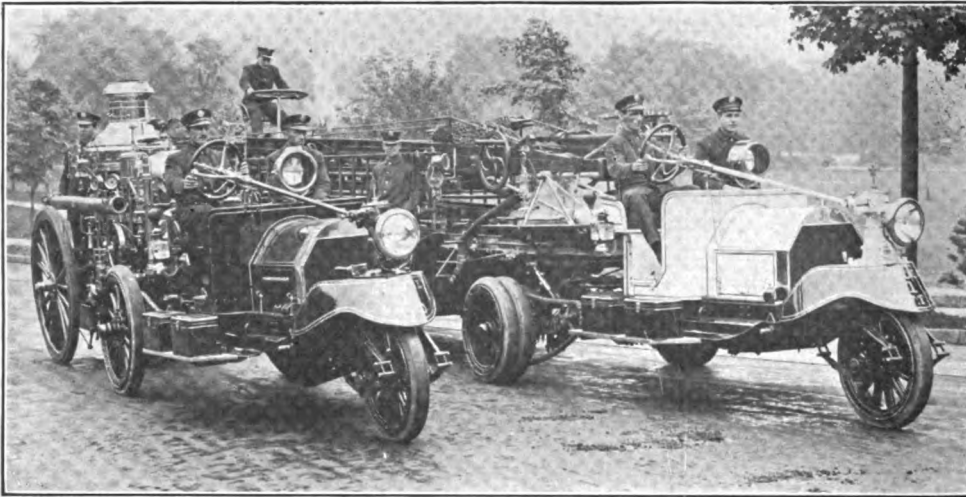
Adams Truck Chassis to Which Members of Central Fire Department in Findlay, O., Fitted Equipment Taken from Apparatus Already Owned by the City.

service with a contractor. There are, however, a much larger number of specially designed motor vehicles supplied for use in public work of one kind and another, than is generally supposed by those who are not well informed, and it will be the object of this discussion to call some of them briefly to mind.

Within the past few years, the fire departments of larger cities have been completely motorized, and even the smaller cities and towns have acquired automobile apparatus, so that, in itself, the motor equipped fire wagon is no longer a novelty. The various types of such vehicles produced by the industry would afford opportunity for a single discussion occupying many times

for land and building. The motorized engine house is cleaner and more sanitary for the men. But, in many cases, the city already owns horses and apparatus, and the land and buildings. To the small city or town, therefore, the purchase of a machine often involves the more than the first cost of vehicle.

This feature has been given due consideration by the manufacturer, and many are offering means for overcoming the difficulties presented. On this page is illustrated a combination chemical and hose wagon built by the members of the central fire department in Findlay, O. It differs somewhat from standard design, it is true, but it offers an important suggestion to the small



Two Knox-Martin Tractors Which Solved the Problem of Saving Existing Apparatus for the Fire Department of Mount Vernon, N. Y.

community which may desire the advantages of of automobile apparatus at limited cost. The chassis is that of an Adams 1.5-ton truck, made by the Adams Bros Company of Findlay. The equipment—body, chemical tank, hose, ladders, etc.—was taken from a piece of apparatus already owned by the city.

Still another suggestion for the municipality which does not care to dispose of its present equipment, yet desires the efficiency of motorized apparatus, is to be found in the illustration showing the solution adopted by the fire department in Mount Vernon, N. Y. In this instance, the city owned two heavy pieces, one a steam fire engine and the other a large hook and ladder truck, and purchased two Knox-Martin tractors, made by the Knox Automobile Company, Springfield, Mass. The saving in maintenance cost as a result of the change from horses has averaged about \$60 a month, or a little better than \$2 a day.

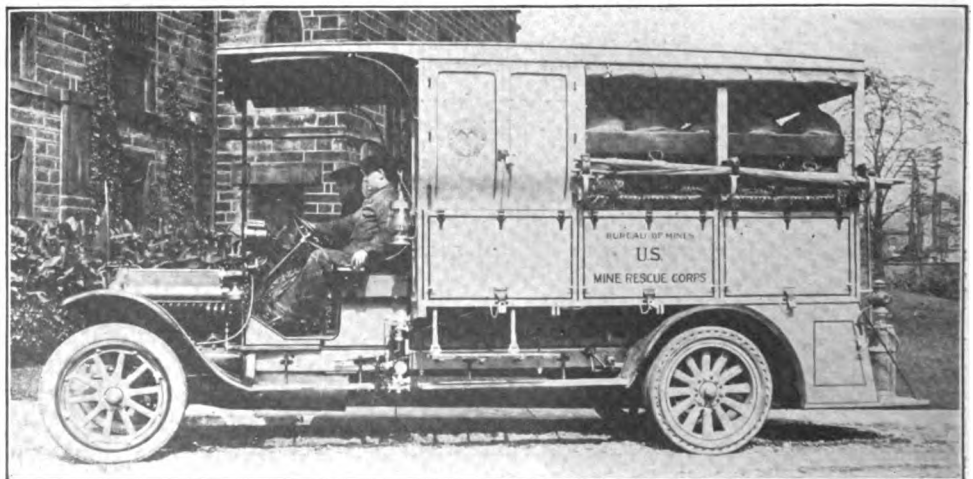
The need for prompt and efficient service is quite as marked in the police department. With particular reference to the patrol wagon, attention may be drawn to the vehicle shown herewith, recently supplied to police of New York City by

the Willys-Overland Company, Toledo, O. The chassis is that of a Willys Utility 1500-pound wagon, fitted with a special screen side body, providing room for 12 persons inside and two on the driver's seat, the only change in the standard model being an increase in the wheelbase, from 120 to 144 inches. Not all patrol wagons are fitted with a screen side body,

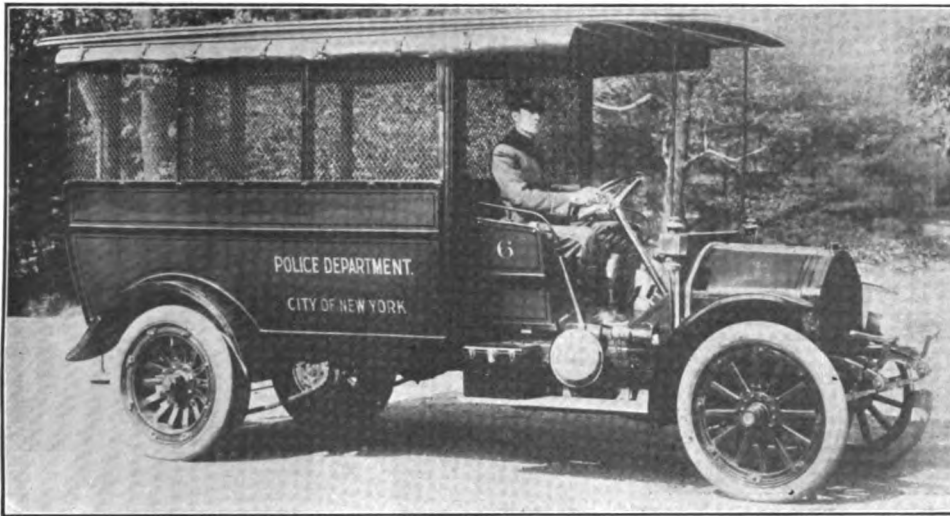
and it will be noted that this one is supplied with curtains, making it possible to entirely shield the occupants from view. The Willys-Overland Company has decided to specialize on this type of vehicle, and the initial order for the New York department was 25 machines. Of course other companies are specializing in this work, this reference being noted only as an example.

Saving Human Life.

Most smaller cities prefer a combination patrol wagon and ambulance. Worcester, Mass., has three, besides the one shown herewith. This is a White vehicle, made by the White Company, Cleveland, O. It differs from the combination machines, which also are of the same make, only in the absence of the windows at the side. This is strictly a public service vehicle, and as such may not be expected to possess the same ornate



Mine Rescue Wagon Fitted to White Chassis Recently Installed at Pittsburg, Penn., by United States Bureau of Mines.



One of the 25 Patrol Wagons Recently Delivered to the New York City Police Department by the Willys-Overland Company.

appearance that would be found in a privately owned hospital ambulance, however, the main features of economy and efficiency are presented. This particular machine has been in service over two years and during that time has been instrumental in saving hundreds of people from serious results or loss of life, through the ability of the police department to rush them to hospitals or place them in charge of physicians in time of accident.

Mine Rescue Wagon.

The saving of human life is a factor that cannot, of course, be expressed in dollars and cents. The item of economy enters very little into the equation in that instance, while efficiency is of the utmost importance. The United States government is setting a valuable example to cities and towns in this respect, through its bureau of mines, which has stationed the special miner's wagon illustrated, also a White chassis, at Pittsburg, Penn. This step has been taken in an effort to interest municipalities, and mine owners, in such districts, in providing similar service.

The body is constructed with many compartments for

carrying the tools, instruments and utilities which might be used in the event of a mine explosion, etc., Beneath the driver's seat are two Draeger reviving outfits, and under the body on a sub-frame are six oxygen tanks. The oxygen pump is at the left side and is driven by the motor. Other paraphernalia carried are: Tent, 22 feet of rope, three miner's picks, three miner's shovels, a four-pound sledge, two axes, saws, hose couplings, reducers, spanners, 200 feet of half-inch rope, lifeline reel, telephone system, bits, braces, chisels, hacksaws, snatch blocks, mine lanterns, two first aid boxes, 50 regenerators, two pulmotors, and, in fact, everything that might by any means be needed in case of a mine accident, even to a caged bird, which is taken into the mine to detect the presence of poisonous gases. Vehicles of this type, although somewhat differently equipped, are used quite extensively abroad, particularly in the mining districts of Great Britain.

Street Department Work.

Of course the street department has use for numerous types of vehicles. Most of these cannot be regarded as specially designed, but the



White Ambulance in Service with the Police Department of Worcester, Mass., for the Past Two Years.



KisselKar Combination Street Sprinkler and Flushing Machine.

Kissel Motor Car Company, Hartford, Wis., has brought out the combined street sprinkler and flusher presented herewith. This is mounted on the regulation KisselKar three-ton truck chassis, to which is fitted a 1000-gallon galvanized steel tank. Pressure is produced by taking the water by gravity from the bottom of the tank into a two-stage centrifugal pump direct connected with the motor. It is then forced into distributing pipes and out through adjustable nozzles for flushing, and through two pipes to sprinkling attachments of the vehicle type.

As a result of the growing tendency for using oil on streets, several types of vehicles designed for such service have made their appearance. One of these is shown elsewhere in this issue, in connection with the review of the Boston motor truck show. Motor street sweepers also are used quite extensively abroad, and in this country, in some instances.

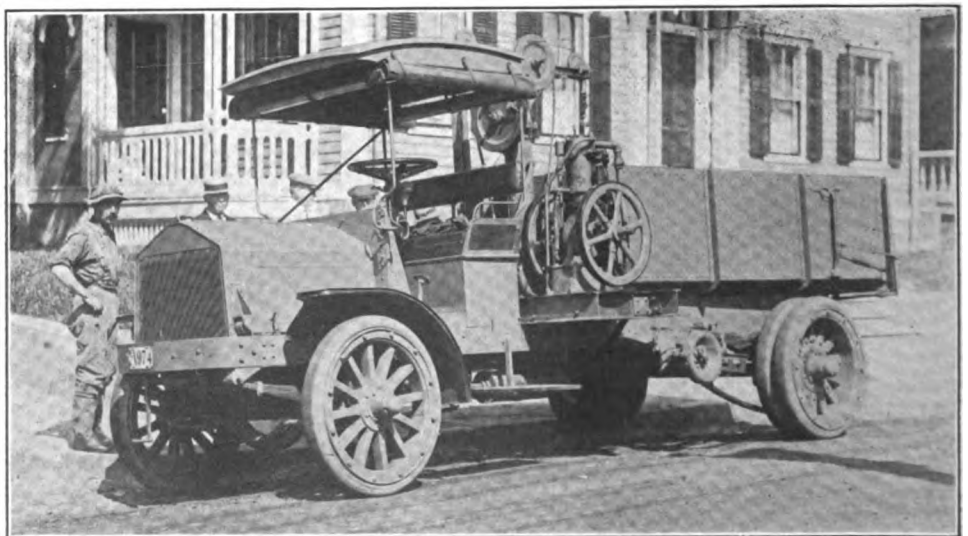
In another place, attention is drawn to a new type of body utilized in Paris for carting street sweepings. This serves to call to mind the garbage disposal wagons in service both in this country and abroad. In many instances this involves the use

of a specially constructed body similar to that shown on the F. R. A. M. truck, to which reference is made, but in others the Knox-Martin tractor has been utilized to decided advantage in hauling loaded horse drawn wagons of the type already in service. Under this latter plan, horses are used in collecting the garbage and in delivering it to some central point, from which point the tractor is called upon to transport the loaded vehicles to the disposal plant.

In the Sewer Department.

Special mention may be made of the sewer department in considering the equipment installed by the city officials of Pawtucket, R. I., for cleaning catch basins, and shown herewith. The chassis is that of a Standard three-ton truck, made by the Standard Motor Truck Company, Detroit, and the body is from the factory of the Monahan Vehicle Company, Providence, R. I.

The particular feature of the outfit is the arrangement for hoisting and dumping the refuse, which was devised by James Nesbit, an employee of the department. Directly back of the driver's seat is a two horsepower single-cylinder auxiliary engine, geared to a hoisting drum, from which a cable is run through the centre of the crane and over pulleys on the arm. This engine draws its fuel supply from the same source as the regular motor which propels the truck, and the exhaust communicates with the muffler. The water circulation is connected with the radiator, so that the two engines utilize practically the same system. At the front of the body is an hydraulic hoist for dumping the load, this comprising a long cylinder with a piston forced up-



Standard Truck Chassis, Equipped with Special Apparatus, in Service with Sewer Department in Pawtucket, R. I.

ward by oil from a gear pump, which is driven by a connection in the transmission case. This machine is doing the work of six horse carts and 12 men in cleaning out the catch basins of the city.

The subject has been by no means exhausted, although the space has. It would prove of interest to catalogue the long list of products of various makers available for special work in municipalities, each of which has been designed with special reference to economy and efficiency. The only attempt that could be made herein was that of citing a few of the many instances in which the industry has sought to meet the need for public service vehicles calculated to reduce the annual budget, and meet the approval of the tax payers, as well as the city officials.

MOTOR TRUCKS OF AMERICA.

B. F. Goodrich Company has Compiled an Exceedingly Valuable Reference Work.

Prospective purchasers of motor trucks and business wagons will appreciate a copy of "Motor Trucks of America", volume II, which has just been issued by the B. F. Goodrich Company, Akron, O. The work is one of the most complete that has been compiled by any source, presenting detailed specifications and illustrations of some 100 makes of vehicles produced in this country, all of which are fitted with Goodrich wireless truck tires, made by this company, either as standard or optional equipment.

In addition to the descriptive matter respecting the trucks listed, the book, which contains 112 pages, presents timely and valuable articles concerning "Efficiency in Buying and Operating Motor Trucks", "Efficiency Guide for Buying Commercial Motor Cars", etc. Copies of the work may be secured upon application to the company at the factory or any of its branches, and those who are contemplating the purchase of such vehicles would do well to make early application for a copy.

VEEDOL IS A LUBRICANT.

A High Grade Motor Oil Made from Pennsylvania Petroleum Crude.

The Platt & Washburn Company, 7 Broadway, New York City, is marketing Veedol, a high grade motor oil, made from Pennsylvania petroleum crude, and particularly adaptable to pleasure cars, commercial vehicles, motorcycles

and internal combustion engines generally. The company was incorporated in 1885, and has had more than 30 years' experience in the production of all kinds of lubricants.

Veedol is the result of practical research in shop and laboratory, and it is maintained that tests have demonstrated that it will burn up cleanly and is remarkably free from carbon. The qualities emphasized are efficiency and economy. The company has an attractive agency proposition and the trade is invited to write for details.

SNOW AND MERCER TESTERS.

Recent Jersey Blizzard Proves a Boon to Men Employed at Trenton Factory.

It may be that, as a general thing, heavy snow storms are not welcomed by most of those engaged in the automobile business, and par-



Mercer Tester Breaking Trenton Roads After Recent Jersey Blizzard.

ticularly at the factories. But this does not apply to the testing department of the Mercer Automobile Company, Trenton, N. J., as is amply indicated by the accompanying illustration.

When the recent blizzard reached New Jersey most of those employed at the Mercer factory were somewhat inconvenienced, due to the inability of traffic to overcome the unusual conditions. Mercer testers, however, set out almost immediately to break the roads in the vicinity of the factory.

Work of this kind provides a wonderful test for the machines, and the men assigned to this duty found much greater enjoyment in bucking through a good sized snow bank than in driving their cars over ordinary roads. It may be added that the cars found little difficulty in surmounting obstacles that kept ordinary traffic within doors for a time shortly after the storm abated.

IMPROVED ROADS AND MOTORING LAWS.

Attempt to Secure Uniform Legislation Appears to Be Doomed to Failure—New Jersey Solons Will Repeal Statute Passed in 1787—Indiana to Study Highways.

UNLESS published reports are entirely misleading, it would appear that the harmony anticipated as the result of a conference between commissions representing several of the eastern states in an effort to formulate a uniform motoring law was even further than ever from realization. According to information from Albany, the New York commission reported the bill prepared by the conference, but recommended that it be not approved, substituting two entirely new bills, which, if passed, would give New York a motoring law differing in many respects from that of any other state.

One of these bills provides for the repeal of the so-called Callan law, and, instead, owners would be required to pay a single registration fee of \$2 to the state and the present exemption from taxation of the machines as personal property would be stricken out. The other prescribes rules of the road for all forms of traffic. In addition to fees, the first bill would prohibit an intoxicated person from driving, and there is a general provision that violation of the act is a misdemeanor punishable by a fine of not more than \$500 or one year in prison, or both.

MORE NEW YORK BILLS.

One Provides for Universal Lighting and Another for State Traffic Board.

Patterned largely after the law in force in Massachusetts for the past two years, a bill has been introduced in the legislature of New York State providing for lights on all vehicles using the highways during the hours of darkness. Like the Massachusetts statute, the bill makes exception of streets or highways on which street lights are maintained at not more than 500 feet apart. A penalty of \$5 is provided for each violation.

Another new bill introduced in this legislature authorizes the governor to appoint a state traffic commission to regulate motor vehicles. This is to consist of three members at an annual salary of \$5000 each. First class cities are to name one traffic commissioner at a like salary, and second and third class cities may do so when authorized by the commission, these local commissioners to have charge of the traffic squads. The bill also provides for registration fees for

motor vehicles, at \$5 for those of 1000 pounds or less, with \$5 for each additional 1000 pounds. The license fee for chauffeurs is \$2.

The bill providing for licensing all drivers of automobiles was killed in committee.

TO REPEAL ANCIENT LAW.

Automobiles Have Been Violating New Jersey Statute Passed in 1787.

It appears that practically all motor vehicles using the highways of New Jersey have been violating the law. It remained, however, for a cyclecar enthusiast to discover the truth of this statement. Assemblyman Griffin has drafted a bill repealing this measure, which was passed in 1787. In the meantime there is little danger that state or local officials will take steps to enforce its provisions.

In 1787 the legislature of New Jersey made it a penal offense to drive a vehicle having a gauge of less than four feet 10 inches, measured from hub to hub, the penalty being fixed at 20 shillings. Another section of the same law forbids the sale of axles under four feet 10 inches under the same penalty. The general statutes were revised in 1868, but this law seems to have been overlooked by the committee which had the matter in charge. Most all automobiles have a tread of 56 inches, while cyclecars run all the way from 36 to 56.

REVISING INDIANA STATUTES.

Special Committee Appointed to Prepare Recommendations for Next Legislature.

Gov. Samuel M. Ralston of Indiana has appointed a special committee of 15, whose duty it will be to investigate the present road laws of the state and prepare recommendations for the next session of the legislature in January, 1915. It is not improbable that the outcome of this revision will be the creation of a state highway commission with sufficient financial backing to build and maintain roads of the most approved type.

At present the commonwealth has no control, insofar as construction and maintenance are con-

cerned, the only financial aid received from the state being derived from the annual licenses under the motor vehicle law. Repair work is done by farmers and others, who work out their road taxes. The commission will serve without pay, as there are no funds available for this purpose.

DISCUSSES ROAD EXPENDITURES.

Automobile Manufacturer Calls Attention to Essential Facts to Be Remembered.

As an indication of the spirit of co-operation between manufacturers and dealers on the one hand, and the motoring public on the other, it is significant to note that representatives of motor car concerns are giving decidedly more attention to the subject of laws and roads than heretofore. The following statement is made public by George A. Kissel, president of the Kissel Motor Car Company, Hartford, Wis., and serves to call attention to some essential facts to be borne in mind when considering the question of expending money in road work:

Whenever the subject of retrenchment in state expenditures is agitated, some thoughtless or narrow minded persons suggest that too much money is being expended for good roads, and attribute the responsibility to the demands of automobile owners. Such people do not seem to take into account the fact that most states collect for automobile licenses a sum far in excess of the amount applied to highway improvement.

The better the roads, the more interest there is in motoring, and every increase in the number of car owners means additional revenue to the state. That is plain enough, even though we disregard the manifold benefactions to the community through the development of the automobile.

The automobile has unquestionably emphasized the necessity for better roads—I say necessity because the automobile is not a mere plaything, but a profitable utility of the utmost importance. Thousands of cars are driven by commercial travellers, by physicians, by farmers, by countless others in the pursuit of their business. It enables the drummer to cover more territory, the doctor to reach more patients more quickly, and conserves the farmer's valuable time by bringing his markets nearer to him.

The automobile has increased the value of real estate enormously. By its conservation of time it has made accomplishments possible that were never dreamed of before its advent.

Thus, no man who thinks twice will begrudge the advantage gained by the automobile through extension of the system of state highways. There is no movement in this country that does more credit to the foresight and intelligence of the people than the nation wide interest in good roads. It is an investment, not an expense, and an investment that is paying, and will continue to pay, handsome dividends in both health and wealth.

SCOUTING PARTY BUSY.

Southern State and County Officials Welcome Government Engineers on Trip.

Reports forwarded from the headquarters of the American Highway Association, respecting the government scouting party which is on its

way from Washington, D. C., to Atlanta, Ga., to inspect the roads on which it is proposed to inaugurate a system of scientific government management, indicates that the state and county officials throughout the southern states crossed are welcoming the engineers with wide open arms, so to speak. It will be remembered that this association is receiving the co-operation of the United States office of public roads in an experiment which has for its object the construction and maintenance of a through highway along lines advised by the government engineers.

The details of the plan have not been worked out as yet, but the present trip is largely for the purpose of viewing the roads in question and discussing harmonious and uniform methods of securing the desired results. The scouting party consists of the following: Capt. P. St. J. Wilson, assistant director of the office of public roads; Leonard Tufts, chairman of the maintenance committee of the American Highway Association; George P. Coleman, state high commissioner of Virginia; Dr. Joseph Hyde Pratt, state geologist of North Carolina; Preston Belvin, president, State Automobile Association of Virginia; Col. Benneham Cameron, Stagville, N. C.; E. J. Watson, commissioner of agriculture of South Carolina; S. W. McCallie, state geologist of Georgia; George C. Scale, W. L. Spoon and D. H. Winslow, high engineers of the office of public roads.

At one time it was intended to make the start when the roads would be in better condition, but it finally was decided that it would be best for the party to see the highways when at their worst, in order to know what improvements were needed. Reports from the field indicate that conditions have been found much better than might be expected at this season of the year.

MASSACHUSETTS' REGISTRATIONS.

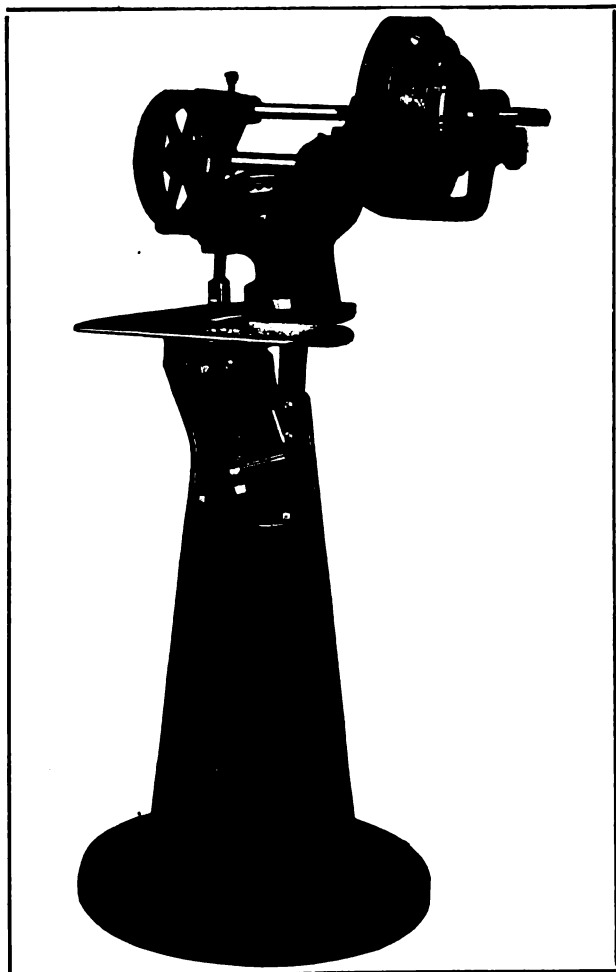
Over 37,000 Automobiles Received Numbers During First Three Months of 1914.

Although the first three months of the new year have not ended as yet, the Massachusetts highway commission reports that over 37,000 automobiles have been registered. This is more than 50 per cent. of the total registration for 1913, which was 62,600, and it is expected that the list will reach at least 75,000 this year. Something like 800 commercial vehicles have received licenses thus far, and it is anticipated that this number will be doubled during the next few months.

MACHINERY, TOOLS, EQUIPMENT AND SUPPLIES.

JOSEPH T. Ryerson & Son, Chicago, is marketing a new machine known as the Lennox Serpentine Shear, which is held to have decided advantages in that it will cut in-and-out curves and a circle with a radius very near that of the blade itself. It is designed particularly for the straight and irregular cutting of sheets and plates.

The machine, which is shown in an accom-



Lennox Serpentine Shear.

panying illustration, has a frame of cast steel spiral construction and designed to provide sufficient clearance for material of unlimited length or width. The spiral steel frame carries all gearing and is mounted on a substantial cast iron base. All gears have teeth cut from solid metal and are provided with cast iron gear guards, protecting the workmen when they are operating the machine.

The blades are made of a high grade tool steel, are set in approximately a horizontal plane, providing a very large cutting bearing on the sheet or plate, and consequently, there is little distortion in the cutting. The upper cutter is positively driven, while the lower is mounted in an adjustable sleeve, so that its position may be varied to allow for different thicknesses of material and for redressing. In addition to this, a cam is provided so that the lower blade can be dropped enough to permit the removal of the sheets without reversing the machine. The cutters have a flush fastening to the shaft so that no nut projects to interfere with the handling of the work, and the knurled edges feed the sheet automatically into the machine. A tool steel pin is provided to take up end thrust on the lower cutter shaft.

Where a number of sheets are to be cut to the same pattern, a template may be bolted to the work and this template followed by guiding against the top cutter.

The machine is driven by means of a two-speed pulley, giving slow speed for intricate curve cutting, and high speed for straight work. The main drive shaft is extended and squared on one end so that a hand crank may be utilized if power is not available.

The shear illustrated has a capacity for cutting No. 10 gauge material and lighter, while other sizes, having capacities of No. 16 gauge, .25-inch and .375-inch material are supplied. All machines are arranged for either belt, direct motor drive or hand power. It is stated that the Lennox will reduce cutting costs fully one-half.

GIDDINGS UNDER-CUT DRILL.

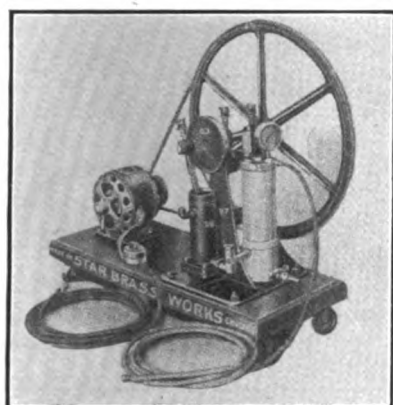
The Giddings under-cut drill is marketed by the Giddings Under-Cut Drill Company, 184 Summer street, Boston, and among the features of the tool is that when utilized in conjunction with a special chuck made by the company, it will bore an under-cut hole which locks the bab-bitt metal securely and permanently to any surface.

The drills are made in standard sizes, .5, .625 and .75 inch. Special sizes are made to meet requirements. It is stated that the drills will bore a hole in five to 10 seconds, and that the best of material and workmanship are incorporated. Descriptive matter and price list will be mailed free on request.

BINKS ELECTRIC TIRE PUMP.

The Star Brass Works, 1911 Fulton street, Chicago, is manufacturing the Binks electric tire pump shown in an accompanying illustration. It is designed both for public and private garages, and efficiency is one of its features.

The equipment is most complete and includes suitable length of hose, flexible lamp cord, etc. The compressor is constructed of the best grade of iron, neatly enamelled. The cylinder has a bore of two inches and a stroke of five, and is bored and ground to exact dimensions. The piston rings are of the same material as the cylinder and as carefully finished and fitted. All parts subject to friction are equipped with spring grease cups. The valves are of special design and material and, it is stated, will require no attention.



Binks Electric Tire Pump.

The compressor is operated by a .25 horsepower 110-volt direct or alternating current motor (60 cycles), and 15 feet of lamp cord with socket is included in the equipment. Lubricant is prevented from reaching the tires by a well designed oil extractor located between the pump and the hose. The relief valve may be set to any desired pressure, preventing over inflation or the bursting of tires. The outfit is mounted on a finished, painted platform two by 12 by 30 inches, and swivelling ball bearing casters make it an easy matter to move the equipment about the garage.

The Binks electric tire pump is constructed to withstand severe service and is liberally guaranteed by a maker having 14 years' experience in the production of pumps. Price lists and descriptive matter will be supplied upon request.

VICTOR ASSORTED GASKETS.

The Victor Manufacturing & Gasket Company, Troy and 21st street, Chicago, in addition to marketing its regular line of copper asbestos gaskets, is producing them in assorted sizes

packed in boxes. Four different boxes are offered the trade, one of which is for the model T Ford car shown in an accompanying illustration.

Box No. 1 contains 12 complete sets of gaskets for the Ford car, these comprising that for the cylinder head, intake and exhaust, etc., and the company calls attention to the efficiency



Victor Assorted Gaskets.

of the gaskets, stating that it supplies the maker of the Ford car with similar members in large quantities. Box No. 2 (that illustrated) contains 200 assorted copper asbestos gaskets selected from the most popular sizes universally used, and in proper proportion for everyday repairs on all makes of cars. The assortment is augmented by 65 selective sizes of gaskets to fit all makes of spark plugs marketed.

Box No. 3 has 50 assorted gaskets constructed especially for the intake and exhaust pipes and manifolds, exhaust flanges, carburetor connections, etc. There are 25 different sizes to choose from, making the equipment a valuable one to the repairman. Box No. 4 contains 100 assorted French type gaskets. All assortments are placed in a neat wooden box with steel hinge cover and the different sizes, etc., are located in compartments. Slips accompanying the boxes give the location and sizes. The trade prices will be forwarded upon request, also a catalogue.

NEW SMITH CATALOGUE.

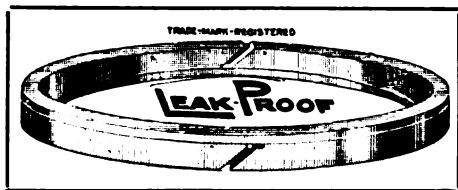
The Joseph N. Smith Company, Detroit, is publishing its 1915 catalogue. The line includes the Ackerman adjustable windshield, screw machine parts and small hardware.



Victor Ford Gaskets.

LEAK-PROOF PISTON RINGS.

The McQuay-Norris Manufacturing Company, St. Louis, Mo., is marketing the Leak-



Leak-Proof Piston Ring.

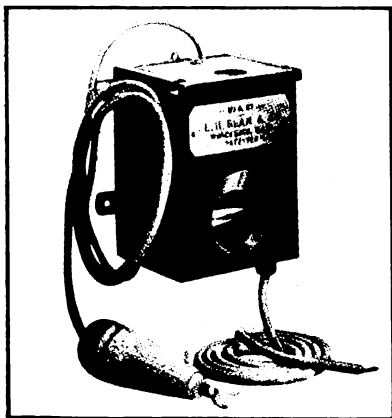
Proof piston head packing rings, which are a radical departure from the conventional types. As will be noted by an accompanying illustration, the rings are made in two pieces and the construction is on the angle iron principle. Consequently there are no unsealed openings, as the flange of each section completely seals the opening of the other, thus obtaining gas tight construction and making for perfect compression.

The Leak-Proof rings are made concentric, instead of eccentric, and one of the qualities of the design is their equal tension on the cylinder walls.

The Leak-Proof rings are in service in a large number of motors, where trouble has been experienced through oil working up past the original members, and they are held to be decidedly efficient where imperfect compression is experienced. The McQuay-Norris Company is issuing a booklet on piston rings, etc., which contains much valuable and instructive data upon the subject. The brochure will be mailed free upon addressing department D of the company.

BEAN TROUBLE FINDER.

L. H. Bean, Worcester, Mass., is marketing the improved Bean trouble finder shown in the



Bean Trouble Finder.

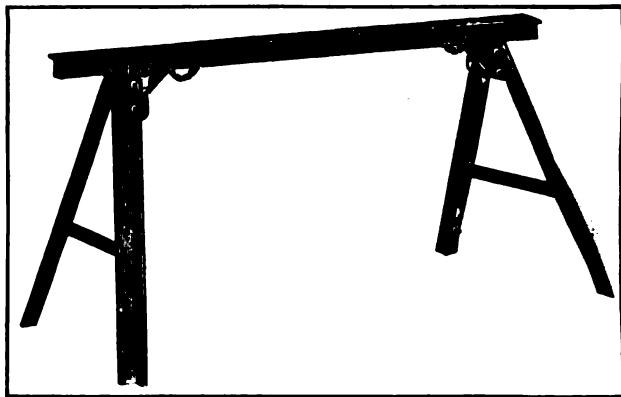
accompanying illustration. It is designed to locate ignition troubles easily and quickly, and the maker states that faults in coils, short circuits, pitted contact points, loose terminals, magneto troubles, etc., can

be expeditiously determined by its use.

The device is operated as follows: In the event the engine misses, secure the trouble finder to the dash under the hood by the screws provided for this purpose. Attach the ground wire to any metal part of the chassis and start the motor. Take the handle from inside of the box and place the brass end on the terminals near the spark plug. If the spark misses in the glass of the finder, it denotes the coil is not adjusted properly. The action of the magneto may be tested in a similar manner; also all leads, etc.

FRASSE FOLDING TRESTLE.

Peter A. Frasse & Co., Inc., 421 Canal street, New York City, is marketing a patented folding steel horse or trestle, which is designed for garage and repair shop service. It is light, strong and made of high grade material. The legs are



Frasse Folding Steel Trestle or Horse.

provided with a locking device, which makes for rigidity when in service, and the trestle cannot be folded until unlocked. One of the qualities of the design emphasized is that it may be folded and stored in a small space. It is made in standard and special sizes.

DOMESTIC TUNGSTEN LAMPS.

The Domestic Tungsten Lamp Company, Weehawken, N. J., is manufacturing the Domestic tungsten lamp for motor car service. A drawn tungsten wire is utilized and it is stated to have a greater vacuum than any other lamp made for automobile use. The vacuum is first produced by an ordinary oil vacuum pump, then a mercury pump. This is held to insure longer life and freedom from a tendency to become black. The company manufactures lamps in varying sizes and voltages. Catalogue and discounts will be forwarded upon request.

BETHLEHEM SPARK PLUG.

Utilizes Multiple Points, Adapting It to Magneto Currents as Well as Other Systems.

It is well known that the continual sparking between two points of a spark plug when a magneto is utilized as a source of current supply, has a tendency to increase the gap. This decreases the efficiency of the motor and frequently is the cause of difficult starting.

The Silvex Company, 60 Wall street, New York City, claims to have overcome these difficulties in its Bethlehem five-point spark plug, which provides five gaps or paths for the high-tension current. One of the qualities of the design is that should one gap be increased by the burning effect mentioned, the high-tension current would jump one of the other gaps, because of the lesser resistance. Obviously the multiple-point plug provides maximum service and without having to adjust any points.

The Bethlehem is held to be absolutely leak proof, a patented gasket construction being utilized, and it is stated that it is not necessary to prime the cylinders as the points so project into the combustion chamber as to produce a hot spark. Economy of fuel is obtained because of a more complete propagation of the flame. The Bethlehem plugs are constructed to meet the requirements of all internal combustion engines and are made in three sizes, half inch, .875 inch, metric and for motorcycles. The company is issuing a free booklet on ignition, which will be mailed on request.

FINISHES 307-HOUR TEST.

Maxwell 25 Horsepower Motor Expected to Repeat Performance in Public Trials.

Chief Engineer Benner of the Maxwell Motor Company, Detroit, reports that a Maxwell 25 horsepower motor recently underwent a private test covering 307 hours in the factory of the company, during which it performed work equivalent to pulling a loaded Maxwell car, with five passengers, at 25 miles an hour for 7675 miles. It is expected that one of these motors will be subjected to a like test under the auspices of the Automobile Club of America in the near future.

Mr. Benner reports that during the first three days of the test the only adjustment needed was the replacement of two spark plugs. On the third day the gasoline line became clogged and the motor was kept running for several hours

by hand feeding of gasoline to the carburetor. After the feed line had been repaired and replaced, but one other spark plug was changed.

At the conclusion of the test the motor was taken down for examination and Mr. Benner states that although it had been run longer than it would have been in an average year of service, the wear was imperceptible. Tool marks still showed in the cylinders and the greatest actual wear amounted to .0007 of an inch. Connecting rod bearings were in perfect shape, showing no wear, and this condition held true of the push-rods and main bearings. Mr. Benner adds that one of the best indications of the slight wear that took place in the moving parts was in the fact that more horsepower was obtained at the close of the run than at the start.

PROTECTION FOR ITS PLANT.

Marion Motor Car Company Has Not Forgotten the Big Flood of Last Spring.

As the anniversary of the big flood of last spring approaches, Indianapolis has taken extensive precautions to guard against a repetition of similar conditions this year. Chief among the measures to protect West Indianapolis is the construction of a rock bound embankment along White river. This barrier extends well above the high water mark of last year and gives ample protection to that district.

West Indianapolis is the main manufacturing portion of the Hoosier capital. Most of the larger industrial plants are located there. During the floods of a year ago this district was seriously affected, practically all of the families there being forced out of their homes. The plant of the Marion Motor Car Company was thrown open as a temporary refuge, and extensive relief work was carried on under direction of the officials of the company. In addition, the company was seriously handicapped as a result of the flood. The embankment will protect not only the manufactories, but also the shipping facilities, so that it is anticipated there will be little trouble of any sort in the future.

"We are not worrying over the prospects this spring", says F. R. Bump, general sales manager of the Marion company. "Coming as it did at the real start of the shipping season last year, the flood handicapped us to a certain extent, but we are assured a heavy spring business this year and look for no holdup in our manufacturing operations or shipping arrangements. Indianapolis appreciates her manufacturing district and has taken necessary precautions".

NEWS OF THE MANUFACTURER AND DEALER.

The following concerns have been incorporated recently to manufacture or sell motor cars, accessories, etc.:

Stutz Auto Company, Albany, N. Y.; \$10,000; C. E. Graves, M. A. Graves, A. E. Graves.

Thompson-McArthur Inspection Company, New York City; \$10,000; to inspect, test and repair electric motors.

Indestructible Tire Corporation, Manhattan, N. Y.; \$200,000; to manufacture and deal in automobile tires; J. A. Inslee, A. P. Anderson, K. R. Morton.

Indiana Auto Racing Association, Indianapolis, Ind.; \$10,000; Frank Blair, Charles Feeser, Jr., Frank S. Feeser, Benjamin F. Royse.

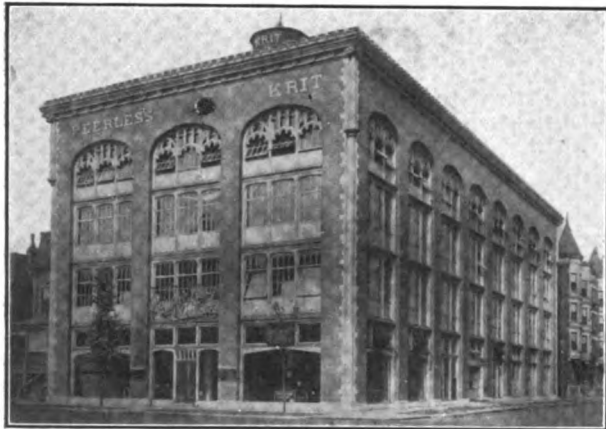
Rylander Manufacturing Company, Biddeford, Me.; \$400,000; to manufacture motor vehicles; J. A. Snow, F. B. Ross.

Chillingworth Manufacturing Company, Jersey City, N. J.; \$200,000; to conduct a general automobile business; L. Muller, H. W. Bissell, J. F. Moore.

Wagner-Dolph Company, Rochester, N. Y.; \$25,000; to deal in automobiles and motorcycles; G. J. Wagner, W. L. Dolph, E. K. VanAlmkirk.

Kilgore Motor Starters Company, Boston, Mass.; \$15,000; Charles D. McCardry, Frederick O. Kilgore, Augustine J. Daly, Mary E. Daly.

Court Street Garage & Automobile Company, Cincinnati, O.; \$20,000; general garage business; M. A. Bear, E.



Home of the McDuffee Automobile Company, Chicago. Agent for Krit, Peerless, KisselKar and Rauch & Lang.

A. Hauck, J. H. Ahlebrandt, Jr., F. E. Burnett, A. C. Caldwell.

Sneed Automobile Company, Gulfport, Miss.; \$10,000; R. J. Sneed, S. R. Sneed and others.

Guenther-Methundy Sales Company, St. Louis, Mo.; \$10,000.

Mason-Seaman Transportation Company, New York City; \$10,000,000; to conduct a general cab and automobile business; William P. Harding and others.

Jiffy Specialty Company, McKeesport, Penn.; \$25,000; to manufacture automobiles and accessories; George Baehr and others.

Springfield Mend-a-Leak Company, Springfield, O.; \$10,000; to manufacture a filler for automobile tires.

Huma-Swan Company, Chicago, Ill.; \$100,000; to manufacture automobiles; Charles C. George, F. Huma, Willis A. Swan.

S. P. Vaporizer Company, New York City; \$10,000; to manufacture and deal in automobile accessories; J. Von Waddy, S. Y. Beach, R. Stevens.

Automobile Trading Company, New Orleans, La.; \$40,000.

Wentworth Auto Livery Company, Chicago, Ill.; \$20,000; to conduct a garage and delivery business.

Knight Motor Company, Fort Dodge, Ia.; \$10,000.

Blair Manufacturing Company, Boston, Mass.; \$1,000,000; to manufacture automobiles and motors; M. A. Danlher, E. T. Roche, J. B. Lazenby.

American Juvenile Auto Company, Toledo, O.; \$10,000;

to manufacture children's automobiles; C. Murphy, W. C. Bluns, A. C. Lucken, L. M. Smith, J. H. Frick.

A. L. Robertson Motor & Supply Company, New York City; \$22,500; Earlyville Smith and others.

Montauk Automobile Sales Company, Brooklyn, N. Y.; \$5000; Louis F. Ohse and others.

Motokart Company, Tarrytown, N. Y.; \$500,000; to manufacture light delivery wagons.

Skiahook Garage, Skiatook, Okla.; \$4000; to conduct a garage; W. J. Schaefer, C. L. Wall, L. E. Mason.

Vehlen Auto Company, Pierre, S. D.; \$25,000.

Panama Tire & Rubber Company, Albany, N. Y.; \$15,000; A. E. Schwartz, G. L. Lewis, S. V. Morris.

Veldome Company, Buffalo, N. Y.; \$30,000; to promote motor races; William M. Wilson, Dai H. Lewis, F. Vokes.

Waite Auto Livery & Garage Company, Cleveland, O.; \$10,000; to operate a garage; A. F. Waite, J. B. Oviatt, C. E. Hubbell, C. R. Brown, A. E. Rogers.

Auto Repair, Storage & Supply Company, Cleveland, O.; \$5000; to operate a garage; T. A. Cretney, N. H. Reed, C. T. Kirkbridge, F. A. Irvine, J. R. Collister.

Corcoran-Seidel Company, Cleveland, O.; \$25,000; to manufacture and deal in motor car parts; G. S. Case, F. W. Treadway, W. H. Marlatt, F. B. Bolton, R. G. Morrison.

Hillane Garage & Machine Company, Columbus, O.; \$10,000; general garage business; C. Shockey, C. S. Williams, J. C. Langley, F. T. Price, C. M. Carmichael.

Automobile Tire Company of New York, Dallas, Tex.; \$10,000.

Frank Van Syckel Garage Company, \$250,000; to operate a garage; H. W. Picking, C. O. Gyer, F. E. Rugeles.

Long Island Tire Company, Freeport, N. Y.; \$1500; to deal in tires; Marle P. Denton, J. S. Denton, H. E. Weitzig.

Lockport Auto Supply Company, Lockport, N. Y.; \$5000; Arthur L. Hoag, John R. Jelley, Edward H. Huber.

WITH THE MANUFACTURERS.

The S. F. Bowser Company, Fort Wayne, Ind., has created an executive board composed of the officers of the company. A. Z. Polhamus is chairman. S. B. Bechtel has been advanced to become general manager; W. G. Zahrt is assistant general manager and E. H. Briggs has been appointed general sales manager of the central district.

The Hans Motor Equipment Company, La Crosse, Wis., one of the largest producers of pumps and gauges for the motor car manufacturing trade, has taken occupancy of its new works. The Hans company has large contracts with such firms as the Lozier, Cadillac and a number of other prominent companies in the industry.

W. J. Geer has purchased the assets of the Cleveland-Gallon Motor Truck Company, Gallon, O., from the receiver. Mr. Geer represents a number of Gallon citizens, who secured the property with the object of organizing a local company to operate the plant. The company went through a receivership because of lack of capital. It manufactures industrial trucks.

The Emerson Electric Manufacturing Company, St. Louis, Mo., has announced the production of a lighting and charging generator for gasoline automobiles.

The Kelly-Springfield Tire Company, New York City, is to build a three-story addition to its already large and up-to-date factory, to cost \$200,000. The contract has been awarded and work will be started at once.

The W. S. Nott Company, Minneapolis, manufactures a new tire called the Atlas, with tough, cut proof tread, both regular and non-skid.

The Ford Motor Company, Los Angeles, Cal., with the parent house in Detroit, has opened its new assembly plant at Seventh and Santa Fe streets. The plant has a capacity of 100 cars a day and will supply southern California, Arizona and southern Nevada.

The Dayton Rubber Manufacturing Company, Dayton, O., has increased its capital stock from \$150,000 to \$1,000,000, for the purpose of providing additional machinery. E. P. Hooven was elected vice president, E. C. Hooven secretary and treasurer, and John A. McMillan, general manager.

The Mercer Automobile Company, Trenton, N. J., will tender Edwin Pullen, the racing driver, a dinner at one of the Trenton hotels on Saturday evening, April 4, as a mark of appreciation for his sensational Grand Prize victory.

The Hydraulic Truck Company, Los Angeles, Cal., has let contracts for a factory building.

The Monroe Body Company, Pontiac, Mich., manufacturer of automobile bodies, will build an addition to its plant in the near future.

The Universal Tire Company, Los Angeles, Cal., has purchased the building of the Dryfus Winery, Anaheim, Cal., and will remodel the building for the manufacture of automobile tires. H. H. Holloway is president.

The Ideal Steel Wheel Company, Cincinnati, O., is to remove to Elkhart, Ind. The idea of the officials of the company is to get closer to the Detroit automobile market. The new officers of the company recently elected are: President, O. G. Harrison; secretary and treasurer, E. H. Maffey; general manager, T. B. Mills.

The Eberly & Orris Manufacturing Company, Mechanicsburg, Penn., is one of the oldest wheel manufacturing concerns in the United States. The company recently made large and extensive improvements to its plant, and is now in a much better position to take care of its ever increasing business. The plant is fully equipped with the latest machinery, and is one of the most complete automobile wheel factories in the East.

The Willys-Overland Company, Toledo, O., contemplates the erection of a large factory at El Paso, Tex. John N. Willys has just returned from this field and says that a factory in that city would serve California, Mexico, Arizona, New Mexico and Texas.

The New Process Gear Corporation, Syracuse, N. Y., is erecting a new three-story concrete and steel building to provide additional machinery facilities for spur and bevel gear work. This new building is to be absolutely fireproof, with brick curtain walls and concrete floors. The addition will be 40 by 100 feet. The building will be equipped with new machinery throughout.

The Texas Company, New York City, is enjoying much prosperity. The income statement for the six months ending Dec. 31, 1913, is as follows: Gross, \$12,217,198; net, \$3,883,973; sinking fund and depreciation, \$905,763; surplus, \$2,978,210; dividends, \$1,050,000; balance, \$1,928,210; previous surplus, \$7,500,000; total surplus, \$9,428,210.

GARAGE AND DEALER.

The McDuffee Automobile Company, Chicago, which recently took over the sale of the Peerless and Kissel-Kar lines in that territory, has added the Krit, the Krit Motor Car Company, Detroit, following the example of the other concerns in abandoning its Chicago branch. The McDuffee company also handles the Rauch & Lang electric. The officers of the company are: President, H. L. Babcock; vice president, C. S. Englebook; secretary, E. J. Ellis; treasurer, G. A. Pierson. It occupies the four-story building, shown herewith, at Michigan avenue and 25th street, the first floor of which is used for general offices and showrooms, with a garage in the rear. The second floor is used for an auxiliary salesroom and storage, the third for repair work and the fourth as a painting and trimming department.

Charles Rubel & Co., Washington, D. C., has entered the local automobile field with the opening of an automobile specialty house at 1312 14th street. The company will handle accessories.

T. J. Riggs, Bowie, Ariz., will erect a new garage which will be modern throughout.

G. W. Crane and **Clarke Bros.**, Livermore, Cal., have combined and will operate under the name of the Valley Garage Company.

William P. Vanderwolf, Montgomery, N. Y., has sold his interest in the Montgomery Garage & Machine Works to William O. Hall. The new firm will be known as Hall & Knoche.

John A. Matz and **Harry Bannister**, Indianapolis, have formed a partnership and will open a repair shop and cyclecar agency at North Capitol avenue, under the name of the John A. Matz & Co.

F. J. Connor, Turlock, Cal., has purchased a building on South Broadway and will remodel same for use as a first class garage.

Charles F. Dutcher, Naples, N. Y., has bought out the Fisher Bros. garage and will conduct it in the future.

Houson & Treichler, Wilson, N. Y., has purchased land and will erect a large and modern garage, costing \$25,000.

G. W. Jones and **W. J. Brace**, Kansas City, Mo., both well known automobile men in Des Moines, Ia., have formed a partnership under name of Hudson-Brace Motor Company. The company will handle the Hudson cars for this territory. Mr. Jones will continue the Des Moines establishment, and Mr. Brace will take care of the Kansas City section.

R. L. Shumaker, Columbus, O., has opened a repair shop in the rear of 170 North Fourth street. The name of the new shop will be the Auto Repair Company.

Carl H. Pausch, Columbus, O., has established a repair shop and vulcanizing plant at 608 South High street.

E. D. Valentine, Springfield, O., owner of the King garage, now located on West Main street, has purchased the property of John Galer at North Fountain street and will build an up-to-date garage.

Ray Yenter, Iowa City, Ia., has entered the automobile business there, being connected with Wilson & Spencer, Hudson and Studebaker dealer for this territory.

Mat Kille, Guthrie Center, Ia., has leased the building at the corner of De Voe and Commercial streets. He is agent for Auburn cars and will conduct a first class garage.

The Lyons-Atlas Company, Indianapolis, Ind., recently opened its handsome new display rooms at Pennsylvania and New York streets, where Lyons-Knight cars will be presented for the local trade. The accompanying illustration indicates the appearance of the building as



New City Salesroom of the Lyons-Atlas Company in Indianapolis, Ind., Decorated for "Opening Week".

decorated for the recent "Opening Week", which was celebrated by the Indianapolis dealers, in lieu of the annual automobile show.

Lower Bros., Guthrie Center, Ia., has opened its new garage recently completed. The firm has the agency for the Kissel-Kar and Maxwell lines.

Crawford & Hock is the name of a new firm which will open a garage in Blue Hill, Neb.

The Crowley Auto & Supply Company, Fort Worth, Tex., has opened a salesroom in the Denver Record building. Marathon and Metz cars will be shown.

H. C. Wieland, St. Louis, Mo., has opened an electric garage at 4919 Delmar boulevard. The location recently was vacated by the Rauch & Lang St. Louis Company.

Karl R. Rogers and **Harold C. Rogers**, Los Gatos, Cal., have taken over the garage business of W. H. Main, located on West Main street.

C. L. Nickerson, Union, Ia., has purchased an interest in the Yonkers & Roorick garage, Conrad, Ia. He will take charge of the repair department.

Evans & Snyder, Mansfield, Penn., has opened a branch in that city. Headquarters are at Wellsboro, Penn. The company handles the Overland and Studebaker cars.

Fish & Westerberg, Benicia, Cal., has taken over the Benicia garage. It was formerly owned by Charles Clyde.

Val Werner, Memphis, Tenn., has opened salesrooms at 342 Monroe street. Grant cars are handled.

RECENT PATENTS.

Valve for Explosive Engines, John W. Meaker, Detroit, Mich.; No. 1,088,714. Filed May 13, 1912.

Wrench, John E. Monaghan, Fort Morgan, Col.; No. 1,088,716. Filed Aug. 16, 1913.

Magneto, Luther James Severson and Luther Earl Severson, Elkhart, Ind.; No. 1,088,736. Filed July 13, 1911.

Emergency Rim, Alexander Turnbull, Glasgow, Scotland; No. 1,088,747. Filed Nov. 15, 1910.

Spring Hanger, Edward F. Goodman, Augusta, Ga.; No. 1,088,777. Filed July 12, 1913.

Emergency Wrench, John Lukowski, Chicago, Ill.; No. 1,088,786. Filed June 30, 1913.

Priming Mechanism, Louis J. Perkins, Lewiston, Idaho; No. 1,088,792. Filed May 20, 1913.

Tandem Seat for Motorcycles, John Alfred Peterson, Modesto, Cal.; No. 1,088,793. Filed Jan. 7, 1913.

Steering Wheel, Charles T. Schroyer, Chester, S. D.; No. 1,088,796. Filed Feb. 15, 1913.

Tire, Harry J. Griswold, Bayside, Cal.; No. 1,088,820. Filed Nov. 23, 1912.

Bumper, Allan L. McGregor, Chicago, Ill.; No. 1,088,832. Filed Oct. 19, 1912.

Tire, Julius Stromeyer, Philadelphia, Penn.; No. 1,088,845. Filed June 7, 1913.

Motor, Edwin L. Thomas, Buffalo, N. Y.; No. 1,088,851. Filed March 7, 1910.

Horn, Herbert H. Frey, Chicago, Ill.; No. 1,088,893. Filed June 29, 1912.

Cable for Electric Current Distribution, Phillip Vassar Hunter, Newcastle-upon-Tyne, England; No. 1,088,902. Filed Feb. 14, 1912; renewed Sept. 5, 1913.

Wheel and Tire, Henry Kitcher, Toronto, Ont.; No. 1,088,905. Filed Feb. 14, 1913.

Tire, Giuseppe Restucci, Naples, Italy; No. 1,088,930. Filed May 5, 1910.

Tire Jack, Warren Willet, Fort Erie, Ont., and Otis E. Bowen, Buffalo, N. Y.; No. 1,088,953. Filed Feb. 7, 1913.

Carburetor, Bruce Drysdale, Philadelphia, Penn., assignor of one-fourth to James W. Mason, one-fourth to John W. Hulton and one-fourth to Walker Hulton, all of the same city; No. 1,088,974. Filed Feb. 6, 1912.

Light and Number Holder, Ray K. Schieb and Howard E. Shaffer, Akron, O.; No. 1,089,014. Filed Dec. 3, 1912.

Platon Ring, Frank Van der Cruyssen, Webster Groves, Mo.; No. 1,089,026. Filed May 26, 1913.

Resilient Tire, Henry Capdeville, Washington, D. C.; No. 1,089,044. Filed May 30, 1911.

Power Mechanism, Percy W. Hodgkinson, Rochester, N. Y., assignor of one-half to Clarence W. Carroll, same city; No. 1,089,053. Filed Oct. 20, 1913.

Tire, Percy B. Dawson, Berkeley, Cal.; No. 1,089,116. Filed Nov. 22, 1911.

Two-Cycle Engine, Louis Illmer, Jr., Reading, Penn.; assignor to Illmer Gas Engine Company; No. 1,089,132. Filed Jan. 21, 1910.

Guard for Incandescent Lamp, Claude A. Lehman and Percy A. Lawrence, Valparaiso, Ind., assignors to McGill Manufacturing Company, same city; No. 1,089,138. Filed Dec. 2, 1912.

Motor, Henry F. Will, Michigan City, Ind.; No. 1,089,173. Filed Nov. 4, 1911.

Nut Lock, Walter R. Wilson, Pittsburg, Penn.; No. 1,089,175. Filed Dec. 31, 1913.

Anti-Rattler for Doors, Horace Ervien, Ogontz, Penn.; No. 1,089,193. Filed Dec. 14, 1910.

Motor, Akbin E. S. Fagerholm, Brooklyn, N. Y., assignor to Nels A. Nelson, same city; No. 1,089,194. Filed Dec. 16, 1911.

Speed Indicating and Recording Device, Walter K. Menns, Chelsea, Mass., assignor to Chelsea Clock Company, Boston, Mass.; No. 1,089,246. Filed April 16, 1913.

Spark Advancing and Retarding Mechanism, Edwin L. Pardee, Marne, Ia.; No. 1,089,256. Filed April 11, 1912.

Shock Nullifying Suspension, Albert Victor Park, South Melbourne, and James Norman Caught and Herman House, St. Kilda, Melbourne, Australia; said Park and Caught assignors to said House; No. 1,089,257. Filed July 30, 1912.

Muffler, Arnold J. Patten, Ellsworth, Me.; No. 1,089,259. Filed May 4, 1912.

Throttling Device, John L. Schindler, Friend, Ore.; No. 1,089,275. Filed May 15, 1913.

Wheel, Archibald Stewart, Keota, Ia.; No. 1,089,284. Filed Jan. 19, 1911.

Shock Absorber, James N. Lewis, San Francisco, Cal.; No. 1,089,363. Filed Jan. 6, 1913.

Carburetor, Francois Bayerley, Oullins, France, assignor to Societe du Carburateur Zenith, Lyon, France; No. 1,089,372. Filed Sept. 17, 1912.

Wrench, Frederick H. Kanning, Hopewell, Mo.; No. 1,089,386. Filed Aug. 8, 1913.

Lamp, William F. Anklaam, Detroit, Mich., assignor to C. M. Hall Lamp Company, same city; No. 1,089,387. Filed May 26, 1913.

Wheel, Edward W. Moon, Sr., St. Louis, Mo.; No. 1,089,428. Filed March 19, 1913.

COMING EVENTS.

March.

March 28-April 4—Show, Springfield, Mass.

March 30-April 4—Show, Denver, Col.

March 31—S. A. E. electric vehicle division meeting, New York City.

April.

April 7-9—S. A. E. standards committee meeting, New York City.

April 9-15—Show, Manchester, N. H.

April 12—Show, Palermo, Italy.

April 12-19—Show, Vienna, Austria.

April 13—Race meet, Brooklands track, Weybridge, England.

April 21—S. A. E. research division meeting, New York City.

April 22—Track races, Bakersfield, Cal.

May.

May 5—S. A. E. electrical equipment division meeting, New York City.

May 12—S. A. E. ball bearing division meeting, New York City.

May 14—S. A. E. motor testing division meeting, New York City.

May 25-26—Targa Florio race, Italy.

May 30—500-mile race, Indianapolis, Ind.

May 30—Track meet, New York City.

May 30—Track races, Providence, R. I.

June.

June 1—Coupe Florio race, Palermo, Italy.

June 6-7—Track meet, St. Louis, Mo.

June 9-11—Isle of Man road race.

June 17-18—Hill climb, Uniontown, Penn.

June 23-26—S. A. E. midsummer meeting, Cape May, N. J.

June 24-26—Meeting National Gas Engine Association, Chicago, Ill.

June 27—Race meet, Brooklands track, Weybridge, England.

June 30—Track races, Sioux City, Ia.

July.

July 3-4—Road races, Tacoma, Wash.

July 4—Track races, Providence, R. I.

July 4—300-mile race, Sioux City, Ia.

July 4—Grand Prix, Lyons, France.

July 17-18—Speedway meet, Seattle, Wash.

July 25-26—Grand Prix, Belgium.

August.

Aug. 27—Race meet, Brooklands track, Weybridge, England.

Aug. 28-29—Road races, Elgin, Ill.

September.

Sept. 5—Track races, Milwaukee, Wis.

Sept. 7—Track races, Providence, R. I.

Sept. 9—Speedway races, Pomona, Cal.

Sept. 9—Road races, Corona, Cal.

Sept. 9—Grand Prix, Italy.

Sept. 26—Race meet, Brooklands track, Weybridge, England.

Sept. 26-Oct. 6—Show, Berlin, Germany.

October.

Oct. 1—Kerosene motor competition, Paris, France.

Oct. 2-3—Track meet, Oklahoma City, Okla.

Oct. 2-3—Track meet, Trenton, N. J.

Oct. 16-26—Automobile Salon, Paris.

Oct. 19-26—American road congress, Atlanta, Ga.

November.

Nov. 6-16—Olympia show, London.

Nov. 8-11—Track meet, Shreveport, La.

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Simple—durable—small—light—and can be attached to any make of car. **Highest efficiency**—can be operated at any speed without injury to working parts. **Will deliver** at 800 revolutions a minute a steady flow of fresh air equal to the pressure from an air tank charged at 115 pounds to the square inch. **Size 6" long, 4" high, 4" wide.**

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- 6-Cylinder Air Pump, Electric Driven, for Garage Purposes, alternating or direct current \$95

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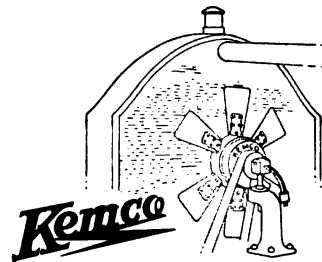
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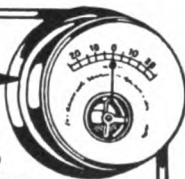
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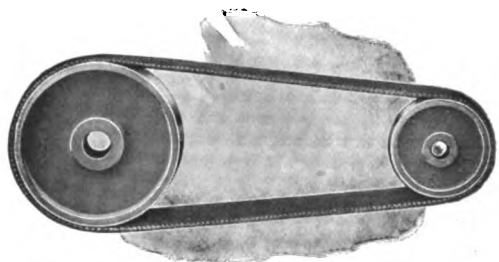
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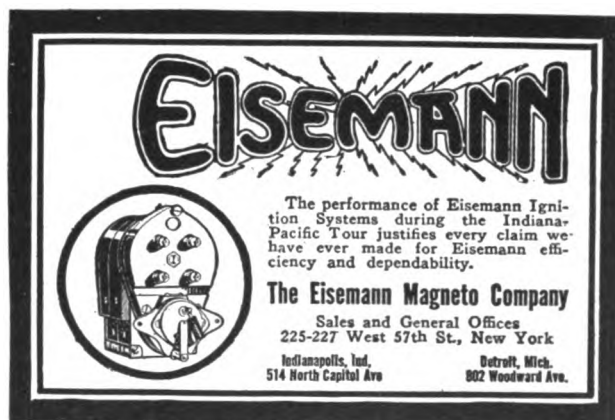
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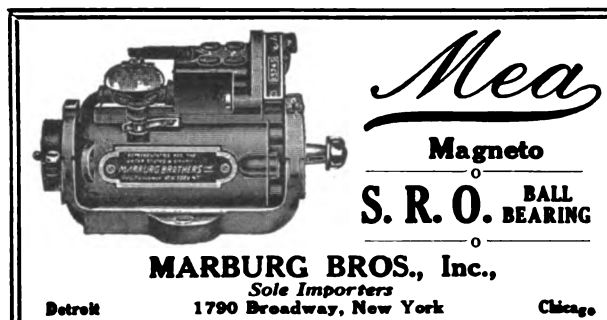
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THE 10% OVERWEIGHT TIRES
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Measured by Mileage, the Cheapest Shoes Ever Made.
Glincher and Quick Detachable, Plain and Break-Skid Treads, Regular and Metric Sizes, for All Standard Rims.
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Heavy, Medium and Light
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We have some interesting facts in connection with increasing your car sales and profits.
Through merchandising strategy we have remedied these flaws. May we tell you about these things and about our kerosene-burning car, equipped with wire wheels, cowl dash, cowl fuel tank? Left drive, center seat control, the most salable car offered today. Write or wire for the facts.
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(BUYERS' GUIDE—Continued.)**BODIES—WOOD AND METAL.**

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Williams Foundry & Machine Co., Akron, O.

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Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.

Sager Co., J. H., 271 South Ave., Rochester, N. Y. (Diamond.)

CARBON REMOVERS. (See Cylinder Cleaning Compound.)

CARS—ELECTRIC PLEASURE.

Baker Motor Vehicle Co., Cleveland. (Baker.)

CARS—GASOLINE PLEASURE.

American Volturette Co., Detroit. (Keeton.)

Austin Automobile Co., Grand Rapids, Mich. (Austin.)

Cartercar Co., Pontiac, Mich. (Cartercar.)

Cole Motor Car Co., Indianapolis, Ind. (Cole.)

Empire Automobile Co., Indianapolis, Ind. (Empire, Little Aristocrat.)

Haynes Automobile Co., 166 Main St., Kokomo, Ind. (Haynes.)

Henderson Motor Car Co., Indianapolis, Ind. (Henderson.)

Jackson Automobile Co., 1400 Main St., Jackson, Mich. (Jackson.)

Knox Automobile Co., Springfield, Mass. (Knox.)

Lexington-Howard Co., Connersville, Ind. (Lexington and Howard.)

Maxwell Motor Co., Inc., Detroit. (Maxwell.)

Metz Company, Waltham, Mass. (Metz.)

Moline Automobile Co., E. Moline, Ill. (Moline.)

National Motor Vehicle Co., 1033 22nd St., Indianapolis. (National.)

Nordyke & Marmon Co., Indianapolis. (Marmon.)

Owen & Co., R. M., 19 W. 62nd St., New York City. (Reo.)

Paige-Detroit Motor Car Co., Detroit. (Paige.)

Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)

Premier Motor Mfg. Co., Indianapolis, Ind. (Premier.)

Reo Motor Car Co., Lansing, Mich. (Reo.)

Studebaker Corp., Detroit. (Studebaker.)

Stutz Motor Car Co., Indianapolis. (Stutz.)

Velle Motor Vehicle Co., Moline, Ill. (Velle.)

(Continued on Next Page.)

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(BUYERS' GUIDE—Continued.)

White Co., The, 828 E. 79th St., Cleveland. (White.)

Branches: 320 Newbury St., Boston; Broadway and 62nd St., New York; 629-633 No. Broad St., Philadelphia; 138-148 Beatty St., Pittsburg, Penn.; 610 S. Michigan Ave., Chicago; Market St. and Van Ness Ave., San Francisco; 120-122 Marietta St., Atlanta, Ga.; 74 Victoria St., Toronto, Can.

Willys-Overland Co., Toledo, O. (Overland.)

CARS—STEAM PLEASURE.

White Co., The, 828 E. 79th St., Cleveland. (White.)
Branches: See Cars—Gasoline Pleasure.

CARS—GASOLINE COMMERCIAL.

Adams Bros. Co., Findlay, O. (Adams.)
Bessemer Motor Truck Co., Grove City, Penn. (Bessemer.)
Blair Mfg. Co., Newark, O. (Blair.)
Cartercar Co., Pontiac, Mich. (Cartercar.)
Commerce Motor Co., Detroit. (Commerce.)
Dart Manufacturing Co., Waterloo, Ia. (Dart.)
Driggs-Seabury Ordnance Corp., Sharon, Penn. (Vulcan.)
Federal Motor Truck Co., Junction and Leavitt Sts., Detroit. (Federal.)
Garford Co., Elyria, O. (Garford.)
General Motors Truck Co., 26 Cadillac Ave., Pontiac, Mich. (GMC.)
Branches: New York, Chicago, Boston, Philadelphia, Kansas City.
Gramm-Bernstein Co., Lima, O. (B. A. Gramm's.)
Knox Automobile Co., Springfield, Mass. (Knox and Martin Tractor.)
Owen & Co., R. M., 19 W. 62nd St., New York City. (Reo.)
Palmer-Moore Co., Syracuse, N. Y. (Palmer-Moore.)
Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)
Reo Motor Car Co., Lansing, Mich. (Reo.)
Studebaker Corp., Detroit. (Studebaker.)
Tarrytown Motor Car Co., Inc., 1790 Broadway, New York City. (MotoKart.)
Velle Motor Vehicle Co., Moline, Ill. (Velle.)
Willys-Overland Co., Toledo, O. (Overland.)

CARS—ELECTRIC COMMERCIAL.

Baker Motor Vehicle Co., Cleveland. (Baker.)
Couple-Gear Freight-Wheel Co., 575 Buchanan St., Grand Rapids, Mich. (Couple-Gear.)
Branches: 30th floor, Singer Bldg., New York; 178 Devonshire St., Boston.
General Motors Truck Co., 26 Cadillac Ave., Pontiac, Mich. (GMC.)
Branches: See Cars—Gasoline Commercial.
General Vehicle Co., Long Island City, N. Y. (G. V.)

CARS—FIRE, POLICE AND MUNICIPAL SERVICE.

Cartercar Co., Pontiac, Mich. (Cartercar.)
Couple-Gear Freight-Wheel Co., 575 Buchanan St., Grand Rapids, Mich. (Couple-Gear.)
Branches: See Cars—Electric Commercial.
Knox Automobile Co., Springfield, Mass. (Knox and Martin Tractor.)
White Co., The, 828 E. 79th St., Cleveland. (White.)
Branches: See Cars—Gasoline Pleasure.
Willys-Overland Co., Toledo, O. (Overland.)

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Branches: See Accessory Manufacturers and Jobbers.

COILS.

Helme Electric Co., Lowell, Mass.

CYLINDER CLEANING COMPOUND.

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.

Milwaukee Auto Specialty Co., 128 Second St., Milwaukee.

Northwestern Chemical Co., Marietta, O. (Carbonox.)

Prest-O-Lite Company, 226 Speedway, Indianapolis. (Prest-O-Carbon Remover.)

Branches: Atlanta, Baltimore, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Indianapolis, Jacksonville, Kansas City, Los Angeles, Milwaukee, Minneapolis, New York, Omaha, Philadelphia, Pittsburgh, Providence, San Francisco, Seattle, St. Louis and St. Paul.

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Culver-Stearns Mfg. Co., Worcester, Mass.; Detroit

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Pyrene Co. of New England, 176 Federal St., Boston.

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Russell Mfg. Co., Middletown, Conn.

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Dover Stamping & Manufacturing Co., Cambridge, Mass. (Dover.)

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Shawver Co., Springfield, O.

GEARS, STEERING.

Ross Gear & Tool Co., 794 Heath St., Lafayette, Ind.

GUNS, GREASE. (See Pumps, Oil and Grease.)

HORNS.

Dean Electric Co., Elyria, O. (Tuto.)

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

(Continued on Next Page.)

(BUYERS' GUIDE—Continued.)

Kent Mfg. Works, Atwater, 4937 Stenton Ave., Wayne Junction, Philadelphia. (Monoplex.)

IGNITION EQUIPMENT.

Kent Mfg. Works, Atwater, 4937 Stenton Ave., Wayne Junction, Philadelphia.

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Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

JACKS, ETC.

Shawver Co., Springfield, O.

LAMPS, TAIL. (See Tail Lights.)

LIGHTING SYSTEMS, ELECTRIC.

Apple Electric Co., Dayton, O. (Apelco.)

Dean Electric Co., Elyria, O. (Dynalux.)

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

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Borne, Scrymser Co., 80 South St., New York. (Colonial.)
Branches: Boston, Fall River, Philadelphia.

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Eagle Oil & Supply Co., 104 Broad St., Boston. (Eagle-line No-Karbon.)

Harris Oil Co., A. W., 326 South Water St., Providence. (Harris.)

Branch: 143 No. Wabash Ave., Chicago.

Haws, Geo. A., 148 Front St., New York. (Panhard.)

Branch: 899 Boylston St., Boston.

Invader Oil Co., 80 Broad St., New York. (Invader.)

Branches: 284 Columbus Ave., Boston; 113 Arch St., Philadelphia; 512 Kenos Bldg., 11th and G Sts., N. W., Washington, D. C.

Miller, Chas. E., 97-103 Reade St., New York. (Pan-American.)

Branches: See Accessory Manufacturers.

New York & New Jersey Lubricant Co., 165 Broadway, New York. (MoToRol, Non-Fluid, Kejex.)

Northwestern Chemical Co., Marietta, O. (Gear-Silence.)

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Valvoline Oil Co., 27 State St., Boston. (Valvoline.)

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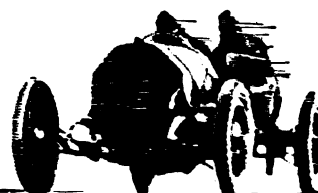
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(BUYERS' GUIDE—Continued.)



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Branches: 514 No. Capitol Ave., Indianapolis; 802 Woodward Ave., Detroit.

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Spltdorf Electrical Co., 98 Warren St., Newark, N. J.
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Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.

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Shawver Co., Springfield, O.

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Martell Motor Co., 1928 Columbus Ave., Boston. (Martell Aligning.)

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are the real standard of plugdom—soot-proof, gas proof, and unbreakable.

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 (J. M.)

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Helnze Electric Co., Lowell, Mass. (H. E. Co. Priming.)

Johns-Manville Co., H. W., Madison Ave. and 41st St.,
 New York City.

Mosler, A. R., & Co., P. O. Box M, Mt. Vernon, N. Y. (Split-
 Fire.)

Silvex Company, The, 60 Wall St., New York City. (Beth-
 lehem Five Point.)

Splitdorf Electrical Co., 98 Warren St., Newark, N. J.
 Branches: See Magnetos and Magneto Supplies.

SPARK PLUG TERMINALS.

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 ston St., Boston; 720 Main St., Buffalo; 2420 Michigan
 Ave., Chicago; 807 Main St., Cincinnati; 2062 Euclid
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 Broad St., Philadelphia; 5940 Kirkwood Ave., Pitts-
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Marburg Bros., Inc., 1790 Broadway, New York. (Mar-
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Hoyd, F. Shirley, 903 Boylston St., Boston. (Baldwin.)

STEEL, ETC.

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 less.)

(Continued on Next Page.)

(BUYERS' GUIDE—Continued.)**TAIL LIGHTS.**

Combination Tail Light Co., 954 Tremont St., Boston.
(Universal Electric.)

TAIL LIGHT DETECTORS.

Harding Specialties Co., Inc., 755 Boylston St., Boston.
(Boston.)

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Prest-O-Lite Company, 226 Speedway, Indianapolis.
(Prest-O-Lite.)

Branches: See Cylinder Cleaning Compound.

TANKS, TIRE INFLATING.

Prest-O-Lite Company, 226 Speedway, Indianapolis.
(Baby Tire Filler, The Emancipator.)

Branches: See Cylinder Cleaning Compound.

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New York City.

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Braender Rubber & Tire Co., Rutherford, N. J. (Braender.)

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Dayton Rubber Mfg. Co., Dayton, O. (Dayton Airless.)

Goodyear Tire & Rubber Co., Madison St., Akron, O. (No-Rim-Cut.)

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United States Tire Co., Broadway and 58th St., New York.
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Branches: See Rims—Removable and Detachable.

TIRES—CUSHION.

Cataract Rubber Co., Wooster, O. (Cataract.)

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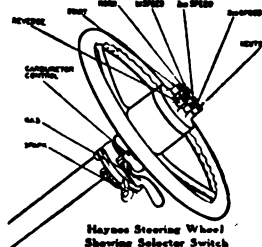
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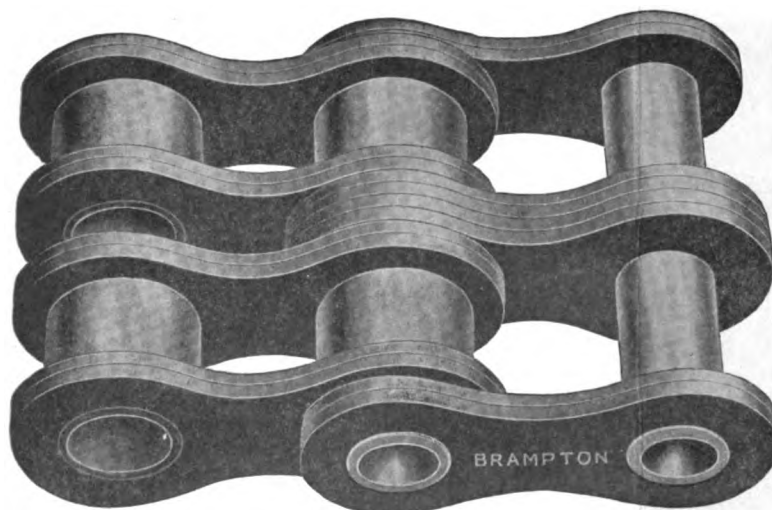
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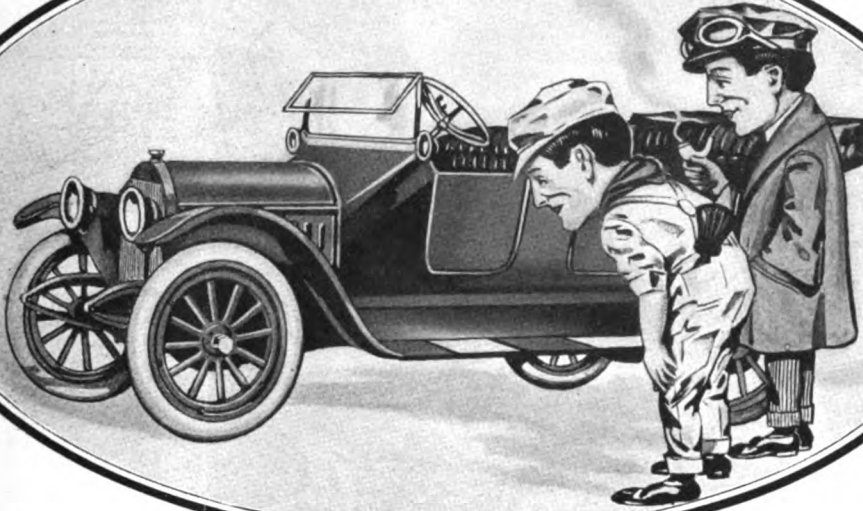
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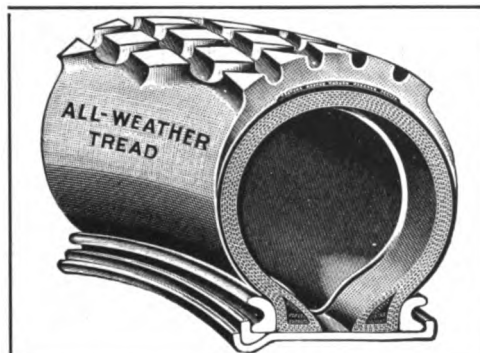
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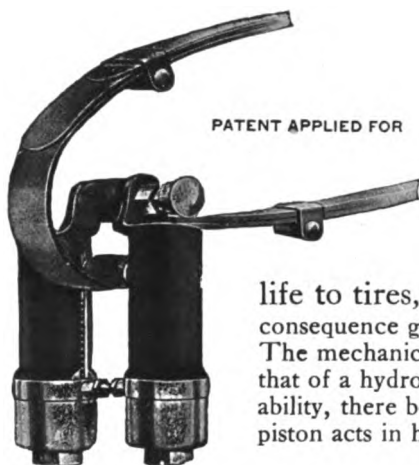
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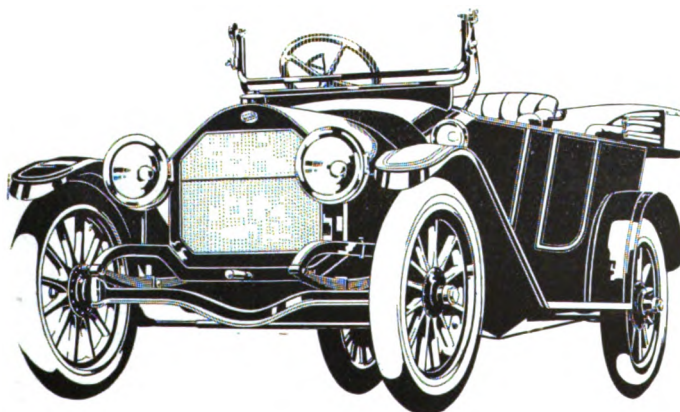
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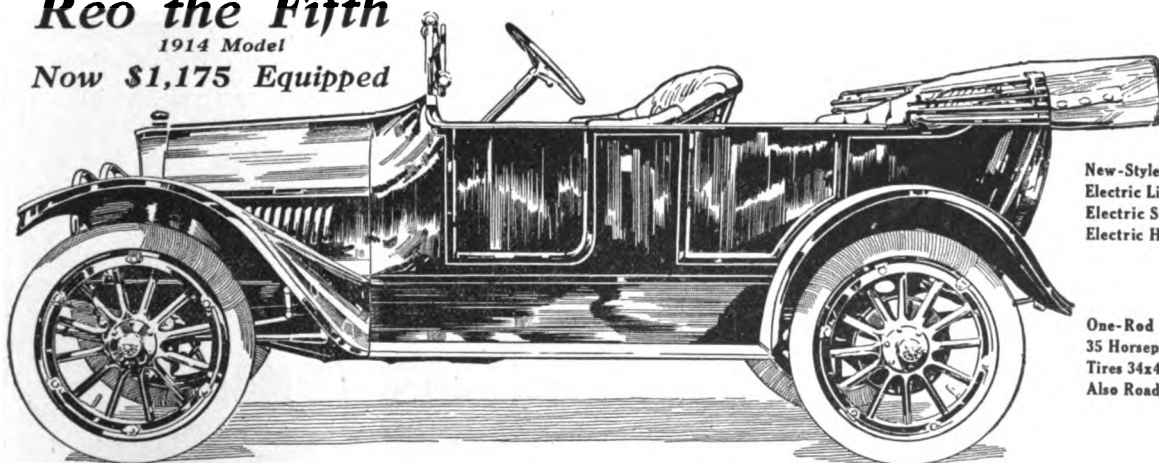
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Annual Overhaul and Equipment Number of

THE
AUTOMOBILE
JOURNAL

ISSUE OF APRIL 25

The one subject of interest to owners of pleasure vehicles at this time is the necessary annual overhauling of their machines. This means replacements of parts, equipments, supplies and accessories. It is the buying season with them and requirements prompt their demand.

In this edition advertisers of parts, equipment, accessories and supplies can bring to the attention of 20,000 car owners what they have to offer at a time when they are in the market and when the heaviest buying of the year is done.

The annual overhaul and equipment number of the Journal will deal with this subject in an exhaustive manner and present the kind of practical information that is eagerly sought by every owner and operator of pleasure vehicles.

A partial synopsis of contents is given below. The readers of this edition represent a wonderful purchasing body and this number will be one of the strongest issues ever placed in the hands of car owners.

SYNOPSIS OF CONTENTS

Value of the overhaul and method of ascertaining its extent.
What the owner may accomplish and suggestions for preparation.
How the repair bill may be considerably reduced.
Tools, supplies, etc., necessary in the work and how to select them.
Preparing the cooling system, cleaning and repairing.
Overhauling the power plant and replacing worn components.
Cleaning and adjusting carburetors and fuel tanks.
Attention necessary with lubricating systems.
Cleaning, adjusting and timing magnetos.
Cleaning and adjusting the transmission and replacing worn parts.
Importance of a thorough overhaul of the steering gear.
Relining brakes and inspection of the rear axle.
Steps necessary in placing the storage battery in service.
Electric lighting and starting equipment for heavy and Ford cars.
Accessories and equipment making for comfort and convenience.

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fail suddenly—
What ?
Then ?



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Go into a dark room, with a lighted match. Then blow out the match, and see how long it takes you to see where you're walking. For several moments, you are practically blind.

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NOTICE

Pursuant to an order duly made by the Referee in Bankruptcy, in the case of Knox Automobile Company, bankrupt, the undersigned will sell at public auction on the steps of the Hampden County Court House in Springfield, Hampden County, Massachusetts, on Friday, the 24th day of April, 1914, at 10 o'clock in the forenoon the following property of said bankrupt.

1. The manufacturing plant of the company, being a parcel of land in Springfield about 120 feet by about 800 feet, bounded on Wilbraham road, Waltham avenue and the railroad, owned or operated by the New York, New Haven and Hartford Railroad Company, having spur track facilities and being in a location easy of access to the centre of the city and also to a good residential district. The buildings of the plant are of regular mill construction.

2. Four other certain parcels of land located near the manufacturing plant and being residential property.

3. All the machinery, materials, raw, wrought and in process and all of the finished product belonging to the said bankrupt estate and all other property and the said estate of every kind and nature, including patents and copyrights, **excepting, however, and excluding cash, bills and accounts receivable, and choses in action.**

Detailed schedules of the above property may be seen at the office of the trustee at the plant.

At the time and place of said sale the trustee will offer said property in lots or parcels in any substantial amount thereof as any bidder may desire. But the trustee reserves the right after having received bids on any lot to again offer the same property as part of a larger lot or to offer the whole of the aforesaid property as one lot if in his judgment it is for the best interest of the bankrupt estate to do so.

The trustee reserves the right to withdraw the whole or any part of said property from sale at any time before the auctioneer announces its completion by the fall of the hammer or otherwise.

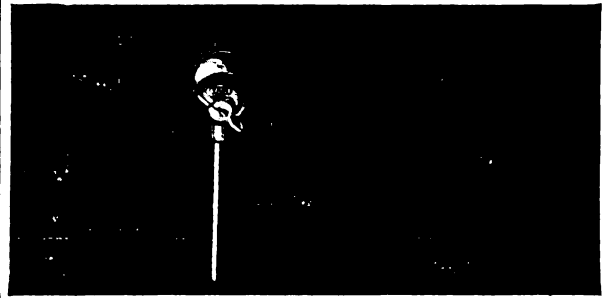
The directors of the Knox Automobile Company have passed a vote directing the clerk thereof to deliver to Charles G. Gardner, trustee as aforesaid, a consent in writing that any person or corporation, now existing or yet to be organized, that may buy from him as trustee as aforesaid the manufacturing plant of the bankrupt company, or any person or corporation to whom or to which the purchaser thereof from him may convey such plant, may assume the name of the Knox Automobile Company or any other name similar thereto.

TERMS OF PAYMENT.

Ten per cent. of any bid made shall be deposited with the trustee at the time the bid is made (which shall be forfeited if such bidder shall fail to take and pay for property struck down to him, but shall be returned to him if the property shall not be struck down to him); the payment of the balance of the purchase price may be deferred for such time as the trustee may agree or consent to provided the settlement of the estate is not delayed thereby and provided that all deferred payments are secured to the satisfaction of the trustee; purchasers shall be entitled to use, turn in and apply in making payment of the purchase money, except the 10 per cent. thereof which shall be paid in cash, any proved and allowed claims against this estate which may be owned by them, reckoning the same for such purpose at such sum as the trustee may determine to be the minimum amount to which said purchaser as the holder of such claims will be entitled to receive on the distribution of the assets of the estate.

CHARLES G. GARDNER, Trustee

Of the Estate of Knox Automobile Company,
Bankrupt.
Springfield, Mass., April 1, 1914.



KICK THE GASOLOCK

Or give it a twist of the wrist and your motor car is absolutely thief-proof.

The Gasolock is the safest device yet invented to prevent joy riding and auto stealing. It shuts off the gasoline in a positive manner which only your Yale key can open again.

The Gasolock prevents waste from leaky carburetors with its attendant dangers of fire and explosion; it saves automobile insurance against theft; it saves your car from joy riders and the ruin they leave in their wake. Your peace of mind when leaving your car at the curb is a big item; your convenience in always having your car is another. Over 2000 motor cars were stolen last year. But the Gasolock protected machine is thief-proof.

Over 1000 in Use in Detroit

The Gasolock is highly finished in nickel plate and can be quickly installed on your motor car, motor truck or motor boat. Two Yale keys are furnished with each device, while we keep a third key filed away under your number. If you should lose one or both of these keys a wire sent us collect will bring the third key under special delivery without charge. It is part of our service to our customers.

The Gasolock is guaranteed for life and can be taken from your old car and installed in your new one at any garage. It practically lasts forever.

YOU NEED THIS PROTECTION ON YOUR AUTOMOBILE—It will mean a tranquil mind and a safe motor car. Why not have both by writing us today? Sent prepaid for \$10.00. Can be installed in one hour at any garage.



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Agents wanted everywhere to sell these devices

PUBLISHER'S AND READER'S PAGE

The Annual Overhaul and Equipment Number of The Automobile Journal will be issued April 25. The articles dealing with the preparation of the car will be comprehensively dealt with and the discussions will be wholly practical. All components of the car requiring attention will be described and illustrated and common sense methods of completing the work outlined. One of the features of the Annual Overhaul and Equipment Number will be the timely suggestions for inspecting the power plant, clutch, transmission, rear axle, etc. Each will be treated separately, enabling the new owner or operator to ascertain readily the repairs and replacements required to obtain maximum efficiency. For the benefit of the new motorist there will be presented an instructive article on the selection of the tools and supplies needed, and valuable advice will be given as to repairs requiring the service of the expert.

Equipping the Garage is a subject in which every motorist is interested, especially the purchaser of a new machine. There is a grow-

ing tendency for the automobilist to maintain his own car and he is always interested in equipment which economizes in time, labor and money. The April 25 issue of The Automobile Journal will contain a special article

on this subject and suggestions will be made for selecting the equipment. The latest devices of this kind will be described and illustrated.

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Particular Attention is drawn to the department describing and illustrating new accessories in this issue. Many practical and useful devices will be noted, and in writing manufacturers always mention The Automobile Journal. The April 25 issue will be replete with new accessories, fittings, etc., and a large number of new Ford specialties will be presented for the first time in any publication.

Always Consult the Buyers' Guide, on pages 87-96, inclusive, when in

need of anything new in cars, accessories, supplies and equipment. The concerns listed are wholly reliable. When corresponding with advertisers mention of the The Automobile Journal will insure prompt attention.

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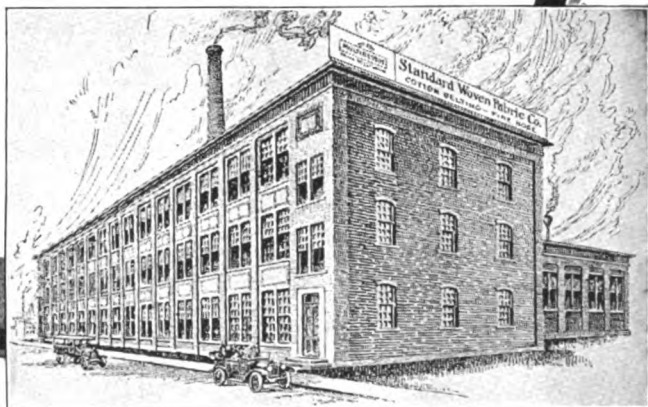
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RAYFIELD

CARBURETOR

WIN AGAIN

"Edwin Pullen in a Mercer wins the fifth international Grand Prix Race at Santa Monica, travelling seventy-seven and two-tenths miles per hour for four hundred and three miles."

Brief as it is, that sensational bulletin adds one more victory to the long list of Rayfield conquests.

Two successive victories in this strenuous race—Caleb Bragg in 1912 at Milwaukee and Edwin Pullen at Santa Monica.

Pullen used a Rayfield because he wanted Rayfield results; he expected to break all records for the Grand Prix; he raised the Grand Prix speed three miles per hour and out-distanced his nearest competitor by 40 miles at the finish.

For 35 laps Pullen broke the world's record for speed, travelling 79.2 miles per hour.

Need we emphasize this remarkable showing of the Rayfield Carburetor? Need we tell you who already know the merits of the Rayfield? It is sufficient to say, Look to the records of achievement in the past; base your judgment on the proofs of men who use Rayfield Carburetors because they want the advantages of Rayfield superiority.

Vanderbilt and Grand Prix

Read this List of Rayfield Victories:

Edwin Pullen.....	1914.....	Grand Prix at Santa Monica
Caleb Bragg.....	1912.....	Grand Prix at Milwaukee
Ralph De Palma.....	1912.....	Vanderbilt at Milwaukee
Ralph Mulford.....	1911.....	Vanderbilt at Savannah

The Rayfield is the only American carburetor that ever won the Grand Prix.

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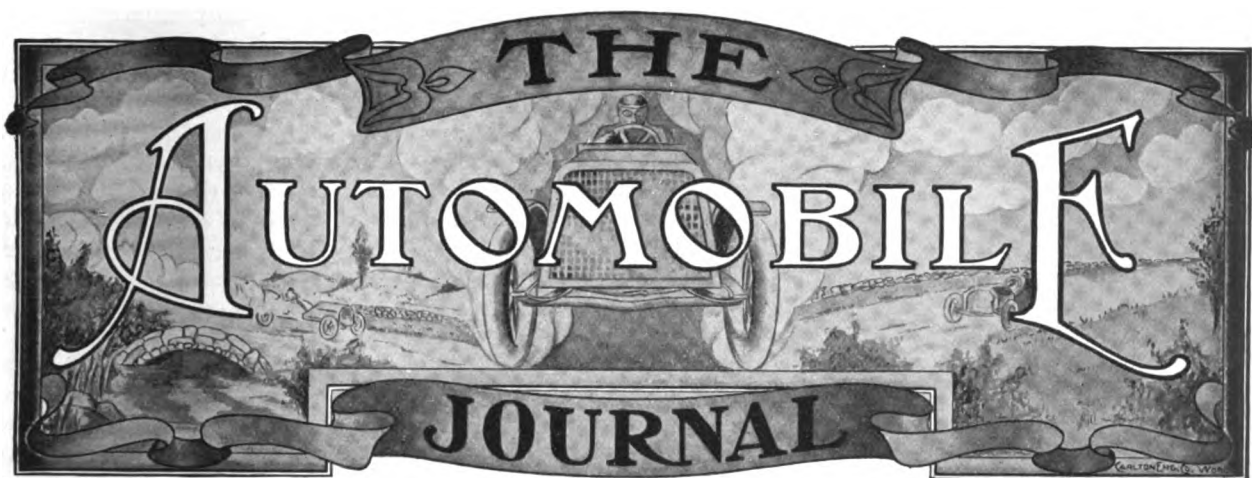
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VOL. XXXVII, No. 5

APRIL 10, 1914

Price, \$1.00 the Year

BEAUTIES OF THE LAKE TAHOE COUNTRY.

How the State of California Has Helped to Make This Section More Easily Accessible to Motorists and Others---Eastern Tourists May Reach This District Over Two Branches of the Lincoln Highway.

(By A. P. Underhill.)

IN THE near future, the transcontinental motorist will leave New York City, or connect with the route at some other point, and travel westward to the Pacific Coast over the Lincoln highway. He will find many points of interest, but for beautiful mountain scenery nothing on the whole trip will equal the vicinity of the Nevada-California boundary. This is the Lake Tahoe country, located on the eastern slope of the Sierra Nevada mountains.

To those who have never seen this wonderful mountain lake, one can only

say: "Go West and see it". It is utterly impossible to describe its beauties and its charm. Photographs fail to reveal its rich coloring, or that of the surrounding mountains.



In the Heart of the Lake Tahoe Country in California, Where the Rugged Sierra Nevadas Raise Their Peaks Thousands of Feet Above Sea Level.

In general shape, the lake is oval, 23 miles long and 13 wide, with an elevation of 6240 feet above sea level; its surface dotted here and there by small islands, and surrounded on all sides by snow-clad mountains, some of the peaks of which reach an altitude of over 11,000 feet. The waters of the lake, coming from the melting snows of these lofty



Passing Cave Rock on the New State Road Skirting Lake Tahoe Near the Nevada Boundary.

peaks, is pure and clear, while the colors shade all the way from pale greens to the deepest blues.

The motorist who approaches this country from the East follows the Lincoln highway to Reno, Nev., where the route divides, one portion running to the north of Lake Tahoe and following the old Emigrant Gap road, and the other leading to Carson, the capital of the state, thence over the Placerville road around the southern end of Lake Tahoe. Both routes come together

again at Sacramento, the capital of California. It is possible to reach Lake Tahoe by either.

On the Emigrant Gap route, the road skirts the Truckee river to the lumber town of Verdi, at which place it leaves the river and climbs over the "Dog Valley Grade", a steady rise for nearly 10 miles. The motorist will usually take this climb on second speed, for, while it is a long pull, the grade is not over 10 or 12 per cent. in the worst places.

After passing the summit, it is a several-mile coast to Truckee, one of the few remaining western frontier towns of the old type. Still, in keeping with the times, it has moving picture shows, dance halls, plenty of saloons and one of the finest collections of butterflies in the country. The lumberman and Basque shepherd come in here for supplies, and, as there is stock raising in the surrounding country, it is seldom that a cow puncher cannot be seen.

The Truckee river is met again at this point, and the highway follows along the winding canon, the steep, heavily wooded sides of which give a constant change of scene. In some places the canon narrows so that there is just room for the river, the highway and the narrow gauge railroad—and it requires some crowding to get them all in, at that.

After this drive of 15 miles from Truckee, the outlet of the river from Lake Tahoe is reached. Nearby is Tahoe tavern, a beautiful mountain hotel of some 300 rooms, and one of the most popular summer mountain resorts in California. There is an excellent garage connected with the tavern, where gasoline and all kinds of



Emigrant Gap Route, About 15 Miles West of Truckee, Cal., 7000 Feet Above Sea Level, with Donner Lake in the Distance.

supplies for the automobile may be obtained.

If the motorist is at all fond of trout fishing, it would be well for him to secure a rod and some flies before reaching the Truckee river, as that river and the streams flowing into the lake are full of fish. A real trout fisherman would never consider it a hardship to stop driving for an hour or two and try for a trout in some likely looking stretch of the river.

Leaving Tahoe tavern, the road follows the lake shore, passing a number of beautiful summer homes, and running in many places through fine primeval forests of cedar, fir and sugar pine. Many of these trees are upwards of 300 years old, and while they cannot be made to compare with the famous big trees of California, they are six and eight feet in diameter and over 200 feet high. The road is winding, with few grades, and is a good mountain highway.

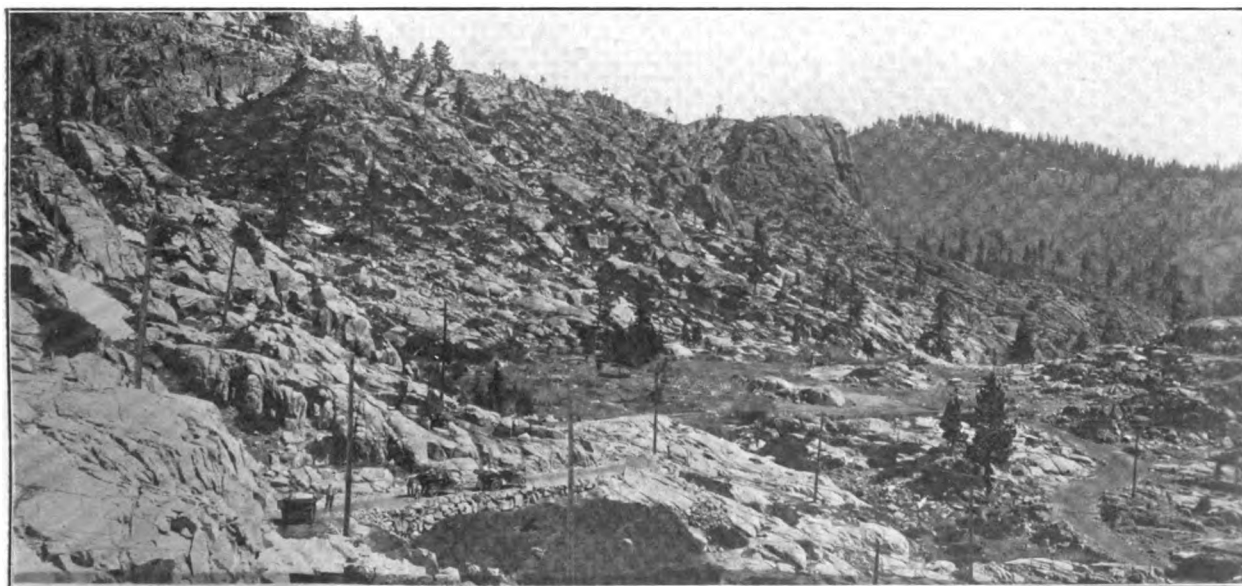
At McKinney's, eight miles south of Tahoe tavern, the motorist comes onto a state road, which was completed last fall, and which forms the connecting link between the north and south ends of the lake. The California state engineer's department is certainly to be commended for undertaking this stretch of road, for it is without doubt the most beautiful mountain highway in this country.

It is built mainly of rotten granite, which packs down to a hard surface, little affected by the snows of winter. The material has the added advantage of being easily acquired, since most of it is to be obtained on the spot, and none of it needs to be carted any considerable distance.



Snow-Clad Mountain Peaks Across Lake Tahoe from the Lake Shore Road Near Glenbrook, Nev.

Rotten granite has been used in a number of road making enterprises in the mountain districts of the Far West during the past two years. Long sections of the Pike's Peak transcontinental route in Colorado were constructed of this material, blasted out of the mountain side practically on the job. Sections of what will be a continuation of this route in Utah also were constructed in the same manner. The material is



Another View of the Emigrant Gap Route Winding Its Way into the Sierra Nevada Mountains Toward the Lake Tahoe District.



Overlooking Emerald Bay from the State Road Cut on a Granite Shelf in the Mountain Side.

particularly well adapted to motor vehicle traffic.

On this Lake Tahoe road, the grades are easy, nowhere steeper than 10 per cent., so that a small car has no difficulty in making the trip. Along this part of the lake the mountain slopes extend down to the water the greater portion of the way, necessitating the cutting out of a shelf on which the road may pass.

For about five miles the road winds along the slope at an elevation of about 200 feet above the lake, allowing one to have views from all points of the compass. After crossing a fine meadow the motorist begins an easy three-mile climb, winding up through a canon that is behind Rubicon point and the low ridge which skirts the lake shore. This is the only part of the highway on which the lake is not in sight, but shortly after reaching the summit, Emerald bay comes into view.

This bay is an arm of Lake Tahoe, almost completely landlocked, and receives its name from the beautiful emerald coloring of the water. This section of the highway has been the bugbear of the road builder, for the mountains slope so steeply to the water that earlier surveys seemed to show that either the cost would be prohibitive or that the grades would be too severe. In 1911, another survey was made, and, after discarding several routes, one was laid out that could be built within an appropriation which the

state felt it could make, and one that kept the grades down to under 10 per cent.

This was finished last year, and the result is that for about four miles, one drives on a winding shelf on the side of the mountain, blasted for a greater portion of the way, out of solid granite. The view may be imagined, when it is considered that the road is over 500 feet above the surface of the bay. A stone parapet on the outside of the roadway gives a feeling of security, and this, together with the ample width, makes it a perfectly safe road to travel.

One of the views shown herewith indicates in some measure the difficulty which was experienced in completing this piece of work, although the photograph reproduced was taken while the construction was under way. As stated, there is now a stone parapet on the side toward the bay, and the road itself is much wider than appears in the picture.

After making nearly a half-circle, the road comes out onto a "hogback", with Emerald bay on one side and Cascade lake on the other. This point is sufficiently high to give opportunity for an excellent idea of the wonderful beauty and ruggedness of the country. The photograph reproduced on the opening page of this article gives a partial idea of the grandeur of the view, although it is impossible for the camera to depict the entire scene, with its combination of lake



The Steamer Tahoe Rounding One of the Islands in the Beautiful Emerald Bay, Lake Tahoe.



Where the Trout Fisherman May Leave His Car to Try His Luck in the Truckee River, Near Tahoe Tavern.

and mountain unlike that of any other section of the country.

For the next few miles the road runs through forests and across meadows, crossing two or three private estates, and comes out again to the lake shore at Tallac. Tallac is a pleasant summer resort built a number of years ago by "Lucky" Baldwin, and is still owned by his heirs. Those who desire may take an interesting side trip of about 15 miles to Fallen Leaf lake and Glen Alpine, both of which are right in the heart of the mountains.

From Tallac around the southern end of Lake Tahoe, the better road will be found by way of Myers, at that point bearing to the left through Lakeside, passing Cave Rock into Glenbrook, Nev. Here is found a broad, level, grass covered country, extending perhaps half a mile back to the mountains, and with a fine sandy beach along the lake front. The hotel faces the beach and is surrounded by a number of most attractive cottages, all of which are so situated as to command a view across the lake to the snow-covered Sierras in California.

If one wishes to visit the old scenes of "Bonanza" days, when silver mining was the big craze in Nevada, it is a pleasant trip over the "King's Canon Grade" to Carson and Virginia City. This is the route of the old stage lines, and as travel was very heavy then, the road was so well built that when the automobile came it required but

very little expense to make an excellent highway.

In those days, there were 10 six-horse stages each way every day, besides numerous heavy freight teams, and the dust was so bad that the road was sprinkled for the whole distance between Sacramento and Virginia City. From Glenbrook, it is an easy climb of 800 feet to the summit, and during the drop of 2500 feet into Carson, wonderful views of Carson valley may be obtained. This valley is well known throughout Nevada as an excellent country for stock raising.

In describing this route from Lake Tahoe to Carson, the southern branch of the Lincoln highway has been followed in the reverse di-

rection. Continuing west from Lake Tahoe, the motorist has the choice of the two routes—the Emigrant Gap road or the Placerville road—either of which is good and they are about equal in length, Sacramento being about 135 miles distant.

Both are interesting. The Emigrant Gap road passes through the towns of Gold Run and Dutch Flat, made famous by Bret Harte's writings, and the centre of the hydraulic mining region in the early '50's. Colfax and Auburn, also on this route, are thriving places in a fine fruit growing country. It is an easy day's drive of about 100 miles for the motorist from Sacramento to San Francisco and the Golden Gate.



View of Lake Tahoe and the Snow Capped Mountains Beyond from Rubicon Point.

INDIANAPOLIS ENTRIES.

Total of 18 Received, Including Oldfield, Who Will Drive a Stutz, and Ralph De Palma.

Barney Oldfield has been selected as the third driver of the Stutz entries in the Indianapolis speedway race by Harry Stutz, who was very much impressed with Oldfield's work recently. This will give the Stutz a very strong team, Cooper, Anderson and Oldfield.

The entry of the three Mercers and the third Stutz brings the total up to 18, the entry of Ralph De Palma in a Mercedes having been officially acknowledged by the speedway management. The field at present is as follows: Burman, driving his own car; Anderson, Cooper and Oldfield, Stutz; Goux, Boillot and Duray, Peugeot; Keene, Bullet; Chassagne, Sunbeam; Guyot and Thomas, Delage; Christiaens, Excelsior; Klein, King; De Palma, Mercedes; Pullen, Wishart and Bragg, Mercer. Ralph Mulford's Peugeot entry has been declined, it is stated, because of the rule forbidding more than three cars of one make starting in a race run under the sanction of the American Automobile Association.

PASSES LIGHT BILL.

Rhode Island Enacts a Law Compelling All Vehicles to Carry Lights at Night.

Rhode Island has joined the list of states indorsing legislation compelling all vehicles to carry lights at night. The Wilcox bill passed both houses and provides for every vehicle to display a light with the exception of those transporting hay. There was considerable opposition manifested by certain teaming companies at the hearing, but the motorists were well represented by able speakers. The automobilists have been working for some time to have a light bill passed and the result is decidedly satisfactory.

CHANGES IN HUPP COMPANY.

President Drake Makes Announcement of Adjustment of Duties of Officers.

J. Walter Drake, president of the Hupp Motor Car Company, Detroit, has made public recent adjustments of the duties of the officers of this concern. F. A. Harris, who was assistant general manager, has been made commercial

manager with greatly increased duties, while C. D. Hastings, who up to this time has had the title of secretary and general manager, relinquishes the latter's duties. He is still secretary of the company, beside acting in an advisory capacity. Mr. Drake continues active supervision over the general affairs of the concern. Otto von Bachellet, who for the last year has been concerned with the production of a small six, has withdrawn, following the decision not to enter the six-cylinder field.

MOTOR CARS IN NEW MEXICO.

Figures Show a Total of 1699, or About One to Every 200 Inhabitants.

New Mexico has but 1699 automobiles, or one car to every 200 inhabitants, according to figures given out by Secretary of State Lucero. The machines represent 110 makes scattered over 183 cities and towns. Chaves county leads with 361, which is about six times as many as Sante Fe county, which has about the same population.

LARGE MOTOR ORDER.

George W. Jagers Manufacturing Company to Build 10,000 Engines for Argo Concern.

The George W. Jagers Manufacturing Company, Racine, Wis., will manufacture motors for the Argo Motor Company of New York, of which Benjamin Briscoe is the head. The contract is said to be for a term of years and calls for the delivery of 10,000 motors and transmissions by July 31, 1915. The following year 20,000 are to be manufactured.

HOUSEL COMPANY BANKRUPT.

Maker of Ford Motor Starter Lists Liabilities at \$26,163.26—Assets Scheduled at \$10,630.69.

A petition in bankruptcy has been filed by the Housel Manufacturing Company, East Rochester, N. Y., in the United States district court at Buffalo, N. Y. The liabilities are listed at \$26,163.26, while the assets are scheduled at \$10,630.69. Of the liabilities \$19,445.94 are in unsecured claims. Of the assets \$2276 are for outstanding accounts. The value of the stock on hand is \$3531.50. The machinery is scheduled at \$2400. The company manufactured a motor starter for Ford automobiles.

BALANCING INTERNAL COMBUSTION ENGINES.

F. W. Lanchester Discusses Defects of Balance, Torque Vibrations and Possible Arrangements of Cylinders and Cranks---Advantages of Multi-Cylinder Engines.

IN A PAPER read by F. W. Lanchester, a member of the Institution of Automobile Engineers, before that body recently in England, the subject of engine vibration and the balancing of reciprocating parts was discussed. The purpose of the paper was the study of the elementary causes of vibration, and the demonstration of methods by which the elimination of vibration may be effected. The examples taken for the purpose of illustration were such as substantially to cover the ground that ordinarily comes within the purview of the builder of engines of the automobile type.

At the outset it may be stated that there are two fundamentally distinct problems connected with the subject of vibration and balancing between which a sharp line of definition exists. There are vibrations proper to any given engine in which the component parts are assumed as rigid within themselves; that is to say, vibrations which are quite independent of any distortion or spring of the material of which the engine is composed.

On the other hand, there are vibrations, or sources of vibration, which are due entirely to the elastic yielding or springing of the engine components, principally the springing of the crankshaft and engine frame, and vibrations of this type may exist in any engine which, considered as rigid, should be vibration free. In the discussion following, it is assumed that the engine components are in themselves rigid, and the question of engine vibration is dealt with on this assumption. Vibrations due to elastic yielding will be dealt with in an article succeeding the following.

Line of Treatment.

If the problem with which we are faced were not confined and limited by the actual conditions of engine construction, that is to say, if we had required to consider the vibration of an entirely undefined engine or piece of mechanism in its broadest possible aspect, we should take our stand initially on the usual mathematician's or physicist's basis of six degrees of freedom, the meaning of this being that the vibrations may be constituted of motions of translation in any or all of the three co-ordinate dimensions of space or of rotations about any or all of the three co-ordinated axes. Fortunately, however, the problem has not to be treated in its broadest form; the conditions are considerably narrowed by the actual nature and character of the machines with which we are concerned, and consequently we can abandon the generalized basis with advantage, and adopt a specialized treatment as more appropriate to the conditions of the problem.

Narrowed Basis of Treatment.

When we have before us the design of a reciprocating motive power engine, or, more broadly, any fluid pressure engine employing the usual piston and connecting rod or equivalent, we find that the complete symmetry of the problem is disturbed, firstly, by the existence of a definite axis of rotation, that is, the functional axis of the engine—the axis direction of the crankshaft, and, secondly, by the existence of one or more axes of piston motion. When we require to consider the balancing problem, and study questions of forces and moments, we find that the constructional features of the engine aforesaid give us a circumscribed problem in which we know just where to look for our unbalanced forces—the reciprocating parts are confined, to directions at right angles to the crank axes—and in which we look for moments in the form of torque variations when we deal with the crankshaft axes, and of rocking moments when we deal with any axes at right angles thereto.

Two Lines of Thought.

There are two different ways of thinking of any problem in balancing or vibration, which, though not fundamentally distinct, are at least sufficiently different to merit a few words of discussion. We may, for instance, in the case of an ordinary reciprocating engine, consider the bed of the engine as fixed (as if, for ex-

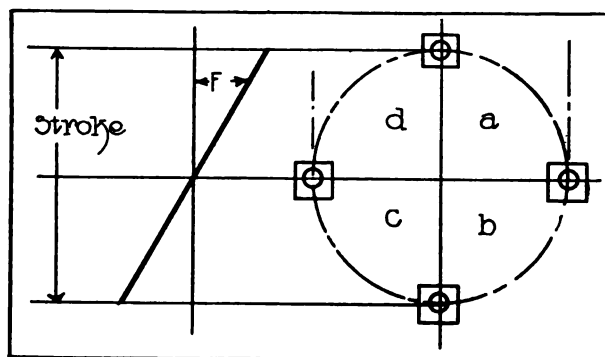


Fig. 1.

ample, bolted to a foundation of overwhelming size), and consider the forces and moments that will result from the functional movements of its parts, or, alternately, we may consider the engine as suspended perfectly freely in space, and study the resultant movements of the engine bed, or of that portion of the engine which is in practice employed as its mounting.

In this latter method of considering the problem, it is necessary to assume a torque applied to the engine equal to its mean torque in the performance of work, in order to prevent its rotating bodily in space. Both the foregoing lines of thought are of value, and are employed in the present paper in dealing with the different phases of the problem.

The Single-Cylinder Engine.

As an initial study, it is convenient to take the case of a single-cylinder reciprocating engine, and to introduce the various defects of balance to which such an engine is subject, one by one. Let us take the elements of a single-cylinder engine and imagine, in the first instance, that the connecting rod is infinitely long, and let us further assume that there is no flywheel, and that the engine is "belted" round without compression. These conditions are naturally impossible of fulfillment, but before we reach the point of discussing the engine as a practical machine, we shall have made the necessary additions to the study as above presented.

Let us suppose that the piston has a mass m , and the remainder of the engine has a mass M . Let us firstly assume that the mass M is fixed, then we have the mass m moving with a strictly harmonic motion through a distance s , by which we will denote the stroke; then at any known number of revolutions R we can calculate precisely the forces that will be set up, acting on the foundation bolts by which the mass M is held, and we know that the motion in question is harmonic and gives rise to forces represented by a straight line diagram as in Fig. 1, in which the maximum value of the force F (in pounds) is given by the expression

$$F = 2\pi^2 m s R^2 / 32.2.$$

If, alternatively, in the above example we suppose the engine frame, that is the mass M , to be free in space, the resultant motion may be derived from the principle that the centre of gravity of a self-contained system cannot undergo change of motion without a force applied from without (this being a paraphrase of the third law of motion); thus, if the centre of gravity of the combined mass $M+m$ undergoes no motion, then it is self-evident that the movement of M will be (under the conditions supposed) a harmonic motion whose amplitude in relation that of m will be inversely as the respective masses, that is to say, s as before being the stroke, the piston will have a motion to $M s / (M+m)$, and the motion of the engine bed will have an amplitude $m s / (M+m)$.

Application of Fourier's Theorem.

Let us now suppose that the simplified conception of an engine be modified to the extent of giving it a con-

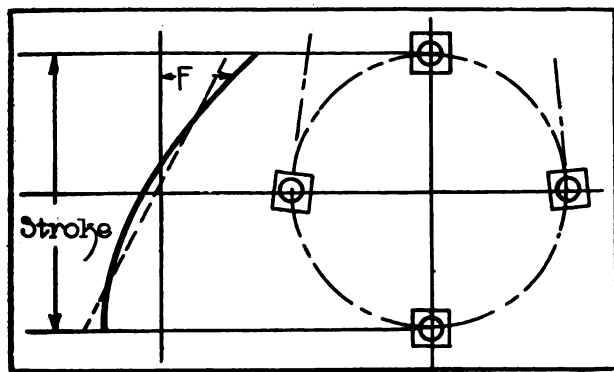


Fig. 2.

necting rod of ordinary proportions. Then, as every engine draughtsman knows, the motion of the piston is no longer a simple harmonic motion, but is an unsymmetrical motion, and the accelerations are greater at the in-centre than at the out-centre, the acceleration curve, and therefore the diagram of force, acting upon the engine foundation (assuming that the engine is fixed) being as represented in Fig. 2, where a dotted line shows the curve (straight line) representing the forces as due to the rod of infinite length previously assumed. Now we know that every periodic curve may be resolved by Fourier's Theorem into a number of simple harmonic components, and it is a fact of no inconsiderable importance in connection with the present subject that the Fourier series may, in the present example, be for all practical purposes represented by two members, namely, the main "fundamental" component represented by the sine curve in Fig. 3 at a , and a secondary motion of twice the frequency, sometimes termed the octave component, also a sine curve, shown in Fig. 3 at b . It will be seen, in referring to Fig. 3, that by superposing the ordinates of the two sine curves a and b , a curve c is obtained optically coincident with the actual piston motion plotted (curve d).*

The full Fourier series of the piston movement is actually an infinite series, but of such rapid convergence that only the two first elements are of practical importance to the engineer, though there are cases in which the third member of the series may have appreciable effect.

*The two curves c and d are, as shown, based on different datum lines; if referred to the same datum they would be undistinguishable.

Torque Vibrations.

It will be noted, in considering the problem as far as it has been developed, that the piston of our one-cylinder engine has two positions per stroke when its kinetic energy is zero, and two positions when its kinetic energy is maximum. This betokens that for a quadrant (roughly speaking) after crossing the in or out centre, the crankshaft is doing work on the piston, and for the succeeding quadrant to the next centre the piston is giving up its energy and doing work on the crankshaft; thus there is an alternation of torque twice per crankshaft revolution, or in Fig. 1 the applied torque (that is to say, the torque required to belt round the engine) will be clockwise in the quadrants a and c , and counter-clockwise in the quadrants b and d . This is not all, however; the torque applied to the crank of the engine and acting on the piston through the connecting rod involves an equal and opposite torque applied to the engine bed or frame from without, and thus the crankshaft torque may be regarded as acting directly on the frame of the engine and undergoing two reversals per revolution. Such an intermittent torque is evidently a potential cause of vibration.

Now let us assume that the engine be furnished with a flywheel. The whole of the foregoing facts remain unaltered provided that we regard the torque applied to the crankshaft as that existing between the crank itself and the flywheel; it may be noted, however, that the belting torque, that is, the torque by which the engine is being artificially driven, no longer need correspond to the internal torque of the engine. For the present it is sufficient to call attention to this point; its bearing on the vibration question will be developed later.

We may assume, as the next step, that the condition of compression be added. As we know, the compression in a single-cylinder may take place at every revolution as in a two-stroke cycle engine, or it may take place every alternate revolution as in a four-stroke cycle engine. On the question of vibration, the effect of compression is felt again in the torque variation; thus during the compression stroke work is expended on the working fluid, and during the expansion stroke the work so expended is restored to the flywheel, so that during the half revolution represented by the compression there is a torque acting on the frame of the engine in the direction of rotation, and during the expansion period there is a torque acting on the frame of the engine in the direction contrary to that of rotation. The torque intermittences due to compression (and explosion) and those due to piston inertia are in practise superposed, and the algebraic sum of the two, which is their resultant, is that which acts on the engine bed. Over certain portions of the stroke and at certain speeds these torques may, to some extent, neutralize one another.

The torques due to compression and those due to piston inertia follow different laws; whereas the former are approximately constant in relation to engine speed, the latter vary as the square of the number of revolutions per minute. The question of the interaction of these two intermittent torques will be considered more fully when the multi-cylinder engine is under discussion.

When we add the question of the explosion pressures, we are, in effect, augmenting to the extent of some four or five times the torque during the expansion stroke, that is, an increase of the torque acting on the crank and flywheel in the direction of rotation and on the frame of the engine in the contrary direction; here we have the recoil or kick so well known in the case of single-cylinder engines as the cause of a most disagreeable vibration. Its effect is felt in multi-cylinder engines, in what is frequently referred to as the "pick up" vibration.

Before we can regard our one-cylinder engine as complete, we must assign weight or mass to the crank itself and the connecting rod. So far as the mass of the crank itself is concerned, it may be completely balanced, as is usual, by rotating counter-weights on the opposite side of the shaft, and so treated it ceases to interest us from the present point of view. The connecting rod is a matter of greater subtlety. As a first approximation, we may, as is customary, consider the mass of the rod as divided between the large and small ends, according to their respective weights, the large end mass being treated as part of the crank itself and balanced by an addendum to the rotating counter-weight on the crankshaft, and the small end mass being treated as in effect part of the piston weight.

If the shank of the connecting rod were of consider-

able mass, it is probable that the above approximate method of treatment would require reconsideration, but, generally speaking, and certainly for the purpose under consideration, the above method of treatment is all that is required.

From the foregoing it will be clear that in a single-cylinder engine, apart from unavoidable torque variations, which are in themselves of a serious character, the question of vibration resolves itself into a question of the mass of the piston and the reciprocating parts. Taking a small vertical motor 85 mm by 88 mm running at 3000 revolutions per minute, the forces due to the main harmonic motion amount to about 800 pounds, and those due to the secondary amount to about 180 pounds, making a total maximum at the in-centre position of 980 pounds. It is customary in single-cylinder engines to endeavor to mitigate the gravity of the position by partially balancing the equivalent reciprocating mass of the piston by rotating weights, but it is quite obvious that such a device is, at the best, a rough-and-ready makeshift. The practise, however, although it does not enable the engineer to eliminate vibration from the cause in question, gives him considerable control over its magnitude and direction; the method is, therefore, of more utility than otherwise might be supposed.

If we take the extreme case when the whole of the reciprocating parts are treated and balanced as if they were rotating parts, that is to say, as if their mass were concentrated on the crank pin, it is of interest to recapitulate the well-known fact that the resultant unbalanced forces may be represented by a reciprocation at right angles to the direction of piston motion of equal magnitude to the original unbalanced forces, at least so far as the fundamental harmonic movement is concerned. Thus, if the structure on which the engine is mounted is better capable of taking vibration or of resisting vibration stresses in one direction than in another, the method in question, even as a means of control, may be of extreme utility.

If, as is frequent, half the reciprocating weight be balanced by a rotating mass on the crankshaft, the well-known result is that the unbalanced residue is the equivalent of a mass equal to the added balance weight rotating at the radius of the crank pin in the direction opposite to the motion of the engine, the maximum disturbing force thus being half its original value. For other proportions of rotary balance weight, the resultant motions are reverse rotations in elliptical orbits or various degrees of eccentricity. In some cases the best degree of balance can be estimated or computed by a study of the conditions of the mounting of the engine or the conditions of usage (in railway work, for example, forces tending to produce a vertical pounding action are objectionable; horizontal forces tending to vary the draw bar pull are also objectionable, but in most cases less so), in other cases, as where it is a question of personal comfort, experiment with a variety of different degrees of "over-balance" is the only safe guide. The term "over-balance" is here used to denote the extent of rotary balance added beyond that necessary to balance the actual rotating parts.

The Two-Cylinder Engine.

We will now pass to a brief study of the additional factors introduced in the case of the two-cylinder engine. There are many arrangements of two-cylinder engines, but, firstly, we will consider the ordinary vertical two-cylinder, that is to say, that in which the cylinders are arranged side by side. In this case it may be noted, first, that the main reciprocating forces may act in the same or in contrary direction according to whether the crank pins are in line or opposed, that is, whether they are together or separated by an angle of 180° . In the former case, so far as reciprocating forces are concerned, the problem resolves itself again into that of the single-cylinder engine, but in the latter case a new factor in the vibration question makes its appearance; the main forces due to the fundamental piston motion (not to its octave) are balanced, but as they act at points separated by the distance between the cylinder axes they give rise to a variable torque or moment about a transverse horizontal axis, and it is customary to term moments of this kind rocking moments, as distinguished from the torque moments about the crank axis itself. It is almost unnecessary to point out that in either case the octave vibrations synchronize, so that, whether the two-cylinder engine has its cranks together or at 180° , the forces that give rise to an octave vibration will be present with full severity.

When we consider the question of torque variation, it is clearly desirable in any multi-cylinder engine to arrange the explosion recoil torques of the different cylinders at equal periods of time; in the two-cylinder engine we have been considering this will be consistent with neutralizing the main inertia force only so long as we are dealing with the two-stroke cycle—that is to say, a two-stroke cycle engine with cranks at 180° will have the impulses occurring at equal intervals of time; when we are concerned with the four-stroke cycle the equal spacing of the impulses can only be obtained by arranging the crank pins in line, and thus the designer has to choose between two conflicting requirements, the equal distribution of impulses and the balancing of the fundamental components of the piston motions. This difficulty was encountered some 25 or 30 years ago in the construction of two-cylinder vertical gas engines; in the early engines of this type built by Messrs. Crossley Bros. the piston motions synchronized, that is to say, the balancing of the inertia forces was sacrificed to obtain equal distribution of the working cycles, but after a very few years this type was superseded by a type of engine in which the cranks were arranged at 180° , the question of inertia balancing being found to be the more important factor of the two. To some extent history repeated itself in the development of the motor car engine, until of recent years the two-cylinder vertical engine has been virtually abandoned.

When we pass to the question of the octave component of the piston motion and the intermittent torque due to piston inertia, we find neither of these can be dealt with satisfactorily on the two-cylinder engine in either form without abandoning both of the other fac-

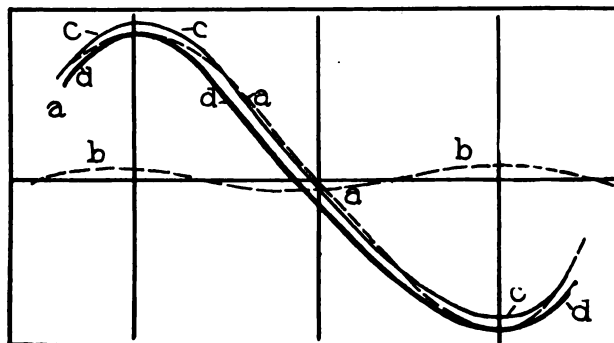


Fig. 3.

tors. It will be necessary to arrange the cranks at right angles to eliminate these as disturbing forces, and bring them down to the status of disturbing couples. Such a crank distribution is generally considered inadmissible.

There is a form of two-cylinder engine which certainly never had the vogue to which it is entitled—the type in which the cylinders are opposed and the cranks are at 180° . An examination of this type of engine shows—firstly, that the impulses are equally distributed; secondly, that the fundamental piston motions are balanced; thirdly, that the octave piston motions are balanced; fourthly, that the rocking moments due to cylinder axis spacing may be made as small as we please. By a little ingenuity and design the cylinders can be arranged coaxially. The only unbalanced features worthy of consideration are the intermittence of torque due to piston inertia already considered, and the intermittence in torque due to the explosion. Without adopting some specially devised means of balancing or going to a multiplicity of cylinders or some form of rotating engine, it is impossible to obtain a more perfect proposition from the balancing standpoint. The author attributes the fact that this type of engine has not come into prominence almost entirely to popular prejudice. The popular idea has been for many years that an engine cannot be right unless it is vertical. It would show quite as high a degree of popular intelligence if an engine were not deemed "the thing" unless painted blue.

In the foregoing section the question of the rocking moment due to the axial separation of the cylinders with their reciprocating parts was touched upon. At the present juncture it is desirable to call attention to the method by which the rocking moment is eliminated in

the types of multi-cylinder engine commonly employed for automobile purposes, that is, the method of symmetrical distribution. The essential point is that the arrangement of the crank throws should be one of "looking glass" symmetry. If we examine the case of the one-cylinder engine in which no rocking moment exists, or the case of the two-cylinder opposed engine in which no rocking moment exists (i. e., with the two cylinders exactly opposite), or that of the four or six-cylinder engine commonly employed in high-class automobiles, it will be found that there is a plane of symmetry at right angles to the crank axis, that is to say, a plane which may be said to represent a reflector, in which the one-half of the engine is a perfect reflection of the other half; thus, in the case of the one or two-cylinder engine the said plane passes through the cylinder centre line, and in the four and six-cylinder engine the plane is situated half way between the middle pair of cylinders. Speaking broadly, it is not strictly essential that a plane of geometrical symmetry should exist; the symmetry may be of a dynamic kind. It is of interest, however, to point out that in the case of all actual automobile engines in which the rocking moment is eliminated, the distribution of cylinders is, as a fact, on a strictly symmetrical basis. It requires no proof to show that an engine possessing symmetry of the kind under discussion is free from rocking moment, since, whatever couple at any instant one-half of the engine may set up, the couple in the opposite half of the engine, being a reflection of this, must be equal and opposite. As an example of a type of engine at one time to be met with in which the rocking moment had not been eliminated, the three-cylinder engine may be cited.

The Ideal Engine.

Passing from the consideration of rocking moment, that is to say, of couples about axes at right angles to the crank axis to those about the crank axis itself, we have to deal with considerations of an entirely different character. The ideal engine from the present point of view would be one in which, as in an electro motor, the driving torque is constant, but no reciprocating engine can be said to have this quality even approximately; the best approximation is obtained by employing a great multiplicity of cylinders. For many years, and, in fact, until comparatively modern times, the question of torque variation was exclusively dealt with from the point of view of the crankshaft; that is to say, in the steam engine, for example, efforts were continually made by designers to get as constant a torque as possible, but always with the end in view of minimizing speed and torque variations on the crankshaft and drive. It was well understood that the greater the torque variation the heavier the flywheel necessary to ensure constant speed, but little, if any, attention was devoted to the question of the torque recoil. When the gas engine came into prominence, and the flywheel at once became a more essential and functionally more important part, the fact was almost entirely overlooked that, although a sufficiently massive flywheel would give the necessary steadiness of running from the point of view of speed variation, it has no influence whatever as affecting the rotational recoil. The author believes that the question was first dealt with prominently in his own patent specification, 15,045 of 1895, but even since that date the question

has been comparatively little understood, and many claims have been made to dispose of the rotational recoil, or, as it is sometimes termed, the "kick", of the explosion, by means that can have no effect whatever, as, for example, the employment of two opposed pistons in one cylinder.

Recoil Torque.

Let us consider the case of a single-cylinder engine, which we will imagine to be provided with some kind of torsion balance, by which the recoil torque about its crankshaft axis can be measured or recorded. We will examine a period comprising one explosion and expansion, and to fix our ideas we will take it that the (brake) effective mean pressure in the cylinder amounts to 100 pounds per square inch; we will assume, as must be approximately the case, that a quarter of this is expended in overcoming the work done externally by the motor during the expansion stroke, thus leaving 75 pounds per square inch as applying an acceleration torque to the flywheel; this will represent roughly six foot-pounds per cubic inch of cylinder volume energy added to the flywheel; if we know the mass and diameter of the latter, we can calculate exactly what increase of velocity this means, and what additional angular momentum the flywheel has received. Now angular momentum received by the flywheel means torque applied to it, and if we regard the whole engine as a self-contained system, then, since the bed and cylinder are not set in opposite rotation, a torque must have been applied to the bed of the engine sufficient in the time of the stroke to impart the calculated angular momentum to the system, and this torque is, in other words, the torque required to resist the rotational recoil of the explosion. It evidently matters nothing whether the cylinder is fitted with a multiplicity of pistons or whether there is an elaboration of connecting rods or link work between the said pistons and the crankshaft. There is a fundamental principle at stake, and as long as energy is stored in the flywheel at each explosion by a torque applied directly or indirectly from the motor cylinder, the equal and opposite torque must be borne by the attachments of the engine, whether it be a foundation or the chassis of a vehicle. There is only one method of evading this intermittent torque known to the author, and it will be discussed later in the paper.

Effects of Torque.

We know that if any given torque acts for a time t , the angular momentum it will communicate is directly proportional to the time t ; thus, in cases where the bed of the engine is not fully secured, the amplitude of the kick of the engine will be greater as the length of time over which the recoil torque acts is greater. Now the torque is virtually independent of the speed of rotation (within the limits of ordinary usage), hence the amplitude of the kick is, in some measure, inversely as the velocity of rotation. It is well known that the roughness of a single or a multi-cylinder engine is greater at low speeds than at high speeds; in fact, this "roughness" is frequently referred to as the "pick up" vibration, since it is felt more acutely when the speed of the engine is low and the throttle is fully open, as when picking up speed from rest or following on a change from a lower gear.

(To Be Continued.)

FERRIS B. FICK PROMOTED.

Abbott Motor Company Announces Several Changes in Personnel of Officials.

Announcement is made by the Abbott Motor Company, Detroit, to the effect that Ferris B. Fick, secretary and treasurer of the company, has taken over the management of the Pittsburg, Penn., branch and the direct supervision of its distributing agencies in a number of states adjoining. He will also act as personal representative of Edward F. Gerber, president of the Abbott Motor Company, whose interests have be-

come so large and diversified as to require assistance.

In addition to Mr. Fick's new duties he will spend a portion of his time at the Detroit plant and will continue to be active in the management of the concern. D. E. Perry has been selected as purchasing agent to succeed Mr. Fick. He brings to this position a thorough knowledge and special fitness for this work.

The Norma Company of America, maker of Norma ball, roller, thrust and combination bearings, has moved its offices from 20-24 Vesey street, New York City, to 1790 Broadway.

SHIP THIRTY-TWO CARLOADS.**Train Load of Cartercars Leaves Factory for Omaha, Neb., Said to Be Record Shipment.**

On March 28 the Cartercar Company, Pontiac, Mich., shipped to the Cartercar Nebraska Company of Omaha, Neb., a train load of Cartercars, consisting of 32 cars or 102 machines. This is stated to be the largest single shipment made by the company into the West. Three carloads to the same concern preceded this shipment.

TRANSCONTINENTAL ROUTE.**Pikes Peak Ocean to Ocean Highway Association Organized at Meeting in St. Joseph, Mo.**

"The Pikes Peak Ocean to Ocean Highway" is the latest development in the transcontinental route situation. The new highway was launched at a meeting in St. Joseph, Mo., recently by the federation and alliance of state and interstate associations already in existence.

The course is from New York through Philadelphia, Washington, Baltimore, Cumberland, Wheeling, Columbus, Dayton, Indianapolis, Springfield, Hannibal, St. Joseph, Belleville, Colorado Springs, Glenwood Springs, Salt Lake City, Reno, Sacramento and Oakland to San Francisco.

The affiliating organizations are: The Springfield Hannibal Highway Association through Illinois, the Hannibal-St. Joseph Cross State Highway Association through Missouri, the Rock Island Highway Association through Kansas, the Lincoln Highway Association through Colorado, and the Utah division of the Pikes Peak Ocean to Ocean Highway Association.

East of Illinois, a co-operative arrangement has been made with the National Old Trails Association to Washington and New York. West of Salt Lake City the route is not finally determined, but temporarily the line of the Lincoln highway is to be used. It is stated that the entire route from ocean to ocean is passable today, and it is the intention through the various state divisions to push the rapid development of every section.

The officers of the new association are as follows: President, C. F. Adams, Chillicothe, Mo.; first vice president, A. Q. Miller, Belleville, Kan.; second vice president, George McIninch, St. Joseph, Mo.; third vice president, Edwin H. White, Springfield, Ill.; secretary-treasurer, A. W. Henderson, Colorado Springs, Col. These officers

with the following constitute the board of directors: W. H. Conway, Springfield, Ill.; Dr. J. R. McConnell, Baylis, Ill.; R. S. Brownlee, Brookfield, Mo.; J. P. Hinton, Hannibal, Mo.; Dr. C. W. Cole, Norton, Kan.; L. A. Libel, Wathena, Kan.; J. K. Rouze, Burlington, Col.; Judge J. W. Deane, Aspen, Col., and two to be appointed by the State of Utah. National headquarters have been established at Colorado Springs, Col.

A. L. GARFORD IS THE HEAD.**Takes Over Dean Electric Company and Organizes Garford Manufacturing Company.**

A. L. Garford, who is president of the Garford Manufacturing Company, is one of the best known manufacturers in the country, having a national reputation as a business man. He organized the Garford Manufacturing Company after purchasing all the property, assets, patents and good will of the Dean Electric Company of Elyria, O., transferring its assets to the new concern. He invested \$150,000 in cash in the new concern for a working capital, which places the company in a very strong financial position, and the fact that he consented to give his name to the new organization is a sufficient guarantee of its success. It will continue the manufacture of telephones, switchboards and electrical apparatus and will increase the production of automobile accessories, which include electric horns, speedometers, lighting and motor starting systems.



A. L. Garford, President of the Garford Manufacturing Company.

The directors of Gray & Davis, Inc., Boston, maker of electric lighting and motor starting systems, have declared a quarterly dividend of 1.75 per cent. on the preferred stock, payable April 1.

IMPORTANCE OF COACH MAKER'S ART.

Increasing Demand for Enclosed Body Types Has Induced Many American Carriage Builders to Enter This Field--Some Features of Foreign Designs.

ANALYSIS of the models offered by American motor car manufacturers for the 1914 season reveals that a much larger percentage of

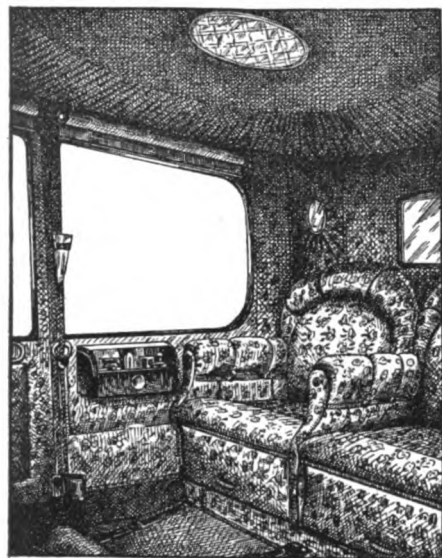


Fig. 1—Couch Arm Chair Design, Produced in Germany.

such makers are producing enclosed types than ever before. And it also is of interest to note that there are a number of concerns heretofore engaged in the strictly high grade carriage business who are turning their attention exclusively to this field. It may not be too much to suggest that in the near future, possibly in 1915, provision will have to be made at the annual automobile shows for a special division devoted to body construction, following the practise long established abroad.

In Great Britain and on the Continent, it is the rule, rather than the exception, to sell the chassis and body separately. In fact, it may be said that it is only within the past few years that any foreign chassis manufacturer has catalogued standard body types, and, in a measure, this departure has been due to the necessity for meeting American competition with American methods, insofar as these may prove practicable under European conditions.

The European coach maker has gained a reputation quite as enviable as that of the chassis builder. The names of Kellmer, Van den Plas and some of the others are almost as well known to motorists on this side as those of the car to which their work is fitted. Indeed, many American machines have been supplied with bodies made abroad by these coach makers.

It may be contended that the same situation

will never exist in this country. Yet the motor-ing public may not be aware of the increasing demand for enclosed bodies which has arisen during the past year, and it is along this line that the American coach maker, if such he may be termed, has directed his efforts most largely.

It cannot be said that the American motor car designer has at any time attempted to force public opinion. Innovations have been suggested or offered, but the few makers who have sought to create a demand for something for which the prospective purchaser was not prepared are in a position to realize the value of popular approval. If more enclosed body models are listed this year, it is because the public has demanded them.

As early as last November, Boston dealers were urging the factories they represented to make every effort to supply the demand for this type of body, which had developed in that district. In December, New York City distributors had disposed of their full allotment of enclosed bodies from the factory and were contracting with special body builders in this country and abroad to make up the deficit on orders already received.

Several well known American carriage builders have been engaged in automobile body work for some years. In the first place, these concerns

undertook this work for parties who purchased foreign chassis and desired distinctive bodies. In most instances the transition from carriage to motor car designing has been so gradual as not to excite comment. However, it now appears



Fig. 2—Limousine Interior Revealed at St. Petersburg Show.

that the pioneers in this field were to prove a nucleus of a highly important branch of the automobile industry in the United States.

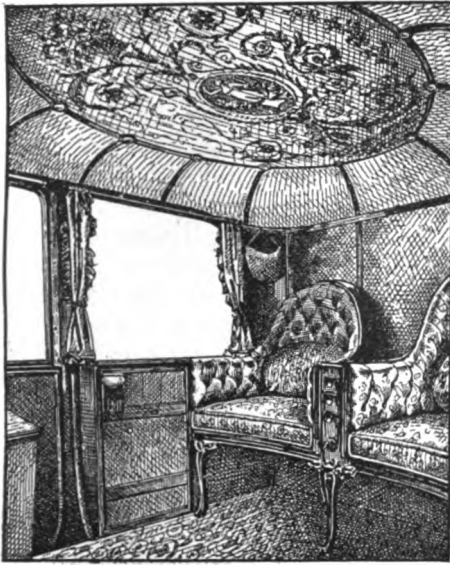


Fig. 3—Another German Design, Suggesting Drawing Room Interior.

Within the past six months concerns in all sections of the country have been announcing their withdrawal from carriage work, in order that they may be able to devote their entire time and attention to the production of automobile bodies. Included in this list is one of the oldest carriage building firms in America, a concern which was established in 1813 and which has been prominent in its field for a century. Among its most notable productions was the coach utilized by Lafayette upon the occasion of his visit to this country in 1824, which has now been placed in an historical museum. It also specialized in railway coaches, and built the cars used in the first railway train in America, on the pioneer line between Albany and Schenectady, in 1831.

It hardly will be expected that the American coach maker will confine his efforts solely to enclosed bodies, but it is along that line in which the greatest possibilities are offered, as is evidenced by the body work revealed at the foreign shows this season. However much past exhibitions have presented conceptions molded and influenced by orthodox forms associated with the horse, this year's shows in Paris, London, Brussels and St. Petersburg, in particular, were characterized by a large number of original and distinctive creations, embodying ideas calculated to provide for all tastes and requirements, and indicating the importance attached to this type by the foreign designer.

Accompanying illustrations serve to suggest, in some measure, the tendency which may be described as departing from the accepted standards of the coach and approaching those of the

drawing room. It is more or less true that certain Continental designers have been working toward this end for some time, but the progress has not been so marked heretofore.

There is a strong suggestion of the parlor sofa, both in the style and finish of the rear seat of the limousine, presented at Fig. 1. This design is favored by a number of German coach makers, although, of course, the details are not executed in the same manner in each instance. This particular conception is by a Berlin concern, while a Leipsic designer has worked out this same idea in an even more elaborate manner, in that the seat, which in this instance is with straight, plain back with blocks above, is padded throughout and the blocks appear in the seat itself, the back and along the base at the front.

Fig. 2 presents a design seen at the St. Petersburg show. In this case the rear seat is not divided, but the upholstery is strictly in keeping with the other interior fittings. It also will be noted that the single dome light, which, when it was first introduced, was expected to fill every want in this respect, has been replaced by the triplex dome light. This is by no means regarded as sufficient by some designers, who add so-called reading lamps at either end of the rear seat, or four small lamps near the corners on the head linings, etc.

Fig. 3 illustrates another German design, in which it would appear that the drawing room feature had been carried to an extreme. But comparison is invited with the Belgian creation at Fig. 4. There is a certain note of refinement

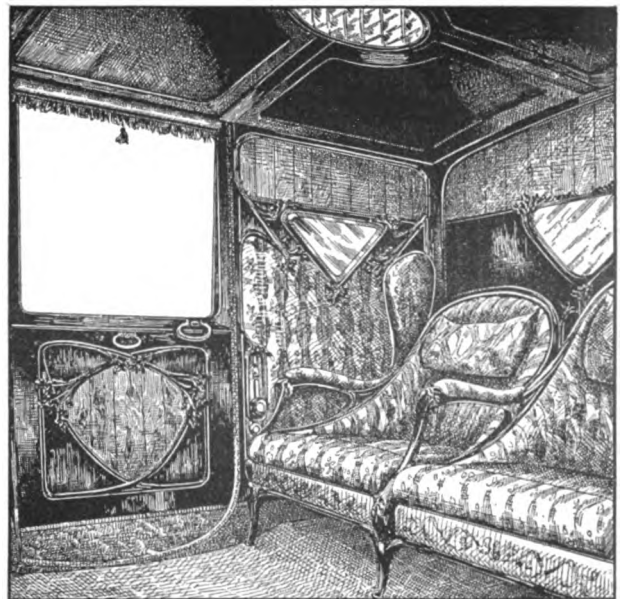


Fig. 4—Drawing Room Treatment as Presented by a Well Known Belgian Designer.

and coziness about these interiors which is wholly unexpected in the motor car.

In the trimming of the interior of most enclosed bodies there is the same general use of Bedford cord, or some such material, that has made itself apparent in this country more recently. In other cases the cloth or leather matches the color scheme of the painting. In England, particularly, all seats are made with a full amount of pitch, this applying to the couch arm chair design, similar to that illustrated. A few of the bodies, especially those by Continental builders, have silk curtains and blinds, finished with ball fringes, and silk down cushions to rest the back or head against are used in some instances.

Apart from the squabbing and cushions, it has become the general practise to finish the interior of enclosed bodies with polished wood,

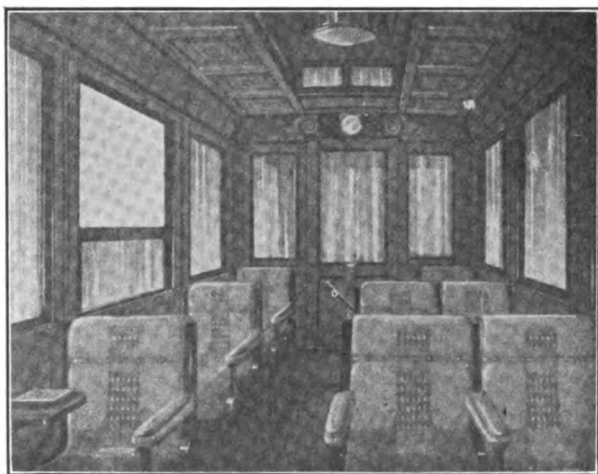


Fig. 5—The Interior View of a Modern German Made Omnibus.

used entirely or in conjunction with the cloth. In this respect extremely good taste is displayed in the choice of the many beautiful woods employed. In one car the roof, doors and front may be finished in sycamore, with a device worked out in deep red moldings. Bird's eye maple, ebony, walnut and satin wood, together with fancy colored wood bandings, inlays of marquetry work in scrolls, vases and other devices, are used to ornament the interior, and when the body is lighted with electricity, as is more often the case, a rich, as well as pleasing, effect is the result.

Several bodies are finished in dark Spanish mahogany, with a gold banding inlay, while in others are to be seen the white sycamore, with black ebony inlay, finished with silver and mother of pearl fittings. A very effective finish

to the roof may be made by using the colored woods to form a device, the sections being filled in with cloth of the upholstery, and having the electric light bulbs dropping from each angle. This treatment is more noticeable in the Continental designs, some suggestion of it being presented in Fig. 3.

Much interest attaches to the many contrivances fitted to the interior, not only the cases with watch and stationery compartments, but those containing toilet requisites, which are often of the most costly description. In some bodies there is a miniature roll top desk in polished wood, under lock and key, containing all that is usually to be found in such desks, with drawers for putting away small articles for safe keeping.

The drawing room feature is combined with milady's boudoir in many instances, the front of the interior compartment being fitted with drawers and cases of the finest cabinet finish, and with electric lights so placed near the cabinet work as to afford every homelike appearance. These cabinets also are made for gentlemen's use, and in some cars they are distributed about the entire interior.

It may be added that electricity is being used most extensively in the enclosed cars abroad, whatever the situation with respect to open cars. Electric lights are applied to the flower vases, and push buttons, located within easy reach, make electricity available for all the uses it can be made to serve.

The ventilation of the enclosed body is an important point which the foreign designer has not overlooked. In several instances the front light is utilized in combination with sliding the forward half of the roof backward, so as to obtain a free current of air without creating a draft.

With very few exceptions all the windows utilized on enclosed bodies exhibited by foreign coach makers this year were of the frameless type, several devices being used by different makers to obtain the movement and prevent rattle. Generally speaking, the total height from the ground is much lower than formerly, while the curved roofs are of such height and the doors of such width as to permit of easy ingress. A low step for entry meets the exigencies of the tight skirt, and the door handle is of a pattern that can be moved readily by daintily gloved hands.

When the situation abroad, as revealed by the shows mentioned, is entirely summed up, it may be held that there is less tendency toward the unusual in exterior appearance and greater attention to providing comfort and convenience in the interior.

GENERAL NEWS OF THE INDUSTRY.

Plant of American Motors Company Sold to Chicago Concern--Second Knight Patent Issued--Kline Motor Corporation Buys Plant in Richmond, Va.

THE plant of American Motors Company, Indianapolis, was sold to Samuel Winternitz & Co., Chicago, this concern making the highest bid of \$110,000 at the sale held March 30. The sale, however, is subject to the approval of Judge Albert B. Anderson of the United States court in which the receivership and bankruptcy proceedings are pending.

Samuel Winternitz announced that it is the intention of his company to resell the property piecemeal, which means that the American underslung car will pass out of existence. The sale was conducted by A. Greenwald, auctioneer, for Frank E. Smith, receiver. The plant had been appraised at \$94,000 and the terms of the sale were \$20,000 deposited at the time of the sale and the remainder to be paid in 10 days.

There were about 20 bidders and the contest narrowed down to the successful bidder and Mr. Finnegan of Buffalo, N. Y., who recently bought the E. R. Thomas Company plant. The purchasing concern has bought several motor car plants during the last few months, these including the Michigan Buggy Company, the Falcar plant, the Midland, Grabowsky and others. There was no real estate involved in the American sale. It was thought that some of the old stockholders would attempt to buy in and reorganize the company.

DECLARES DIVIDEND.

Chandler Motor Car Company to Pay Second on Preferred Stock Since July 1.

According to a dispatch from Cleveland, O., the board of directors of the Chandler Motor Car Company has declared a second dividend on the preferred stock of \$200,000. This completes payment of earnings on this stock since beginning of the organization of the company, July 1 last.

KIRKHAM ASSETS SOLD.

Doctor Buys Building and Will Utilize It for a Hospital, It Is Stated.

The assets of the bankrupt Kirkham Motor Company, Bath, N. Y., were sold to Dr. Douglas H. Smith for \$5010. It is stated that the pur-

chaser intends to use the building for a hospital. The machinery and tools were sold to A. R. Morris of Newark, N. J., for \$8050. Other materials brought various sums. Of the total amount realized \$12,910 will be devoted to meet an outstanding bond issue. This will leave approximately \$1075 for partition among the general creditors, whose claims aggregate \$60,000.

BONNELL RESIGNS.

Was Assistant General Manager of National Automobile Chamber of Commerce.

H. A. Bonnell, assistant general manager of the National Automobile Chamber of Commerce, has resigned to accept the secretaryship of the Manufacturers' and Dealers' Motor Underwriters, an organization formed recently by a large number of motor car manufacturers and others prominent in the automobile industry. He takes up his new duties at once.

Mr. Bonnell has been actively identified with the automobile industry for a number of years. He was manager of the Automobile Board of Trade until it was merged into the present National Automobile Chamber of Commerce. He has been treasurer of the American Automobile Association for a number of years.

KNIGHT PATENT ISSUED.

Second to Be Granted Covers Present Engine and Puzzled Examiners for Eight Years.

Charles Y. Knight has been granted the patent on his double-sleeve engine for which he applied June 4, 1906. The patent was granted March 24 and the number is 1,090,991, and is assigned to Knight & Kilbourne Patents Company of Chicago, a corporation of Delaware.

This patent, which puzzled the examiners for eight years before being issued, also includes a system of lubrication especially designed to feed oil to the upper part of the sleeves. It has 43 claims, which cover the sleeve valve action and the lubricating device. These include the two reciprocating sleeves, their method of reciprocation, the ports within the sleeves, and the sealing of the combustion chamber by the junk ring.

This is the second Knight patent to be allowed in this country. The first was granted Aug. 23, 1910, and covered a single reciprocating sleeve design.

UNITED STATES MOTORS CLEARED.

Last Claim Filed Against It by Carlson Motor & Truck Company Settled.

The last claim against the defunct United States Motors Company has been settled in the United States district court at New York. The claim for \$500,000 was filed by the Carlson Motor & Truck Company and resulted from a suit against the Maxwell-Briscoe Motor Company for infringement of the Carlson patent No. 797,555, covering the cover plate used on the old two-cylinder opposed Maxwell motors.

Carlson claimed \$500,000, but it is understood that this sum was not given the complainant by the Maxwell Motor Company, which made the payment. The latter, which still supplies parts for all of the old cars, has been given a license under the patent.

TO MAKE LIGHT CAR.

New Canadian Concern Organized to Build Machine to Be Called the Herman Johnson.

A dispatch from Fort Erie, Ont., states that the Johnson Motor Company is to be incorporated shortly with a capital stock of \$1,000,000, and that it will be a close corporation, with no stock for sale. The plant is to be constructed on the west side of the Grand Trunk Railway tracks. The total cost of the factory is to be \$200,000. It will have three wings and employ about 1500 skilled hands.

It is stated that the machine to be constructed will be made to retail for \$250, will carry two persons and will weigh about 375 pounds. All of the parts will be made at the factory, with the exception of the tires. The new car is to be called the Herman Johnson.

KLINE BUYS PLANT.

Closes Deal Whereby All of Its Product Will Be Manufactured at Richmond, Va.

Announcement was made at Richmond, Va., recently that, owing to a deal closed by the Kline Motor Corporation, the concern will manufacture the whole of its product at the plant in that

city. It was announced that James A. Kline, general manager, had purchased a large amount of rough and finished material at the receiver's sale of the Kirkham Manufacturing Company at Bath, N. Y., and that it would be shipped to Richmond.

The new arrangement is held to mean that the Kline company will double its number of employees. It has a model plant, with a capacity of approximately 1000 cars a year. The buildings are 500 feet in length and are so constructed that there are two wings 60 feet wide with railroad tracks in the centre for the unloading of the material and loading of the finished product.

E. F. GERBER WINS SUIT.

Trustee of Michigan Buggy Company Fails to Substantiate Claims Against Pittsburg Man.

The suit brought by the Detroit Trust Company, trustees in bankruptcy for the Michigan Buggy Company, Kalamazoo, Mich., against E. F. Gerber and his associated companies, engaged in distributing the products of the bankrupt concern, has been settled in favor of Mr. Gerber, who paid \$50,000 for all claims and in return had transferred to him accounts, motor car parts and claims worth \$67,000.

The Detroit Trust Company claimed that Mr. Gerber owed \$404,000, which was denied, and a counter claim made that the Michigan Buggy Company owed Mr. Gerber. In the settlement made his claims were substantiated.

Mr. Gerber and his various companies had for years taken from one-half to two-thirds of the output of the Michigan Buggy Company, selling it in 14 states. Mr. Gerber, in order to conserve his sales organizations, agents and customers, recently purchased the Abbott Motor Company.

WILL PAY DIVIDEND.

Creditors of B. F. Board Truck Company to Receive a Payment of 40 Per Cent.

The 58 creditors of the B. F. Board Motor Truck Company, Inc., of Richmond, Va. will receive about 40 per cent. of their claims according to a statement made by William H. Gaines, clerk of the United States district court of that city. He will distribute \$9463.79 within a few days, and it is stated that a further dividend of from 25 to 30 per cent. will be paid within a few months.

MARYLAND ELECTRIC TRUCK.**Vehicles of Various Carrying Capacities to Be Produced by New Baltimore Concern.**

The Maryland Electric Vehicle & Manufacturing Company has been incorporated in Baltimore, Md., for the purpose of producing the Maryland electric truck. William Knoblock is general manager.

It is understood that the concern will specialize at first upon the production of a 1000-pound wagon, models of which have been in use for some time. Later, it is stated, other models will be added, these having carrying capacities up to five tons.

TIFFANY BECOMES FLANDERS.**Another Change in Name for Pontiac Company Engaged in Developing Electric Car.**

Detroit automobile circles learn that the name of the Tiffany Electric Car Company, which some time ago took over the assets of the Flanders Manufacturing Company, Pontiac, Mich., has been changed to Flanders Electric Company. The old Flanders concern was engaged in the production of electric cars, and its successor, the Tiffany company, has been at work on the development of a new low priced model of the same type.

The newest company, which is said to include E. Leroy Pelletier and Morris Rothschild, the latter of the Harris Bros. Company, has located its headquarters in the Dime Savings Bank building, Detroit. It has not been made public whether or not the name of the car is to remain as the Tiffany, or be changed to Flanders.

ANOTHER TIRE COMPANY.**Concern Incorporates for \$1,500,000 Under the Laws of Connecticut.**

The Norwalk Tire & Rubber Company has been incorporated with capital of \$1,500,000 under the laws of Connecticut, and it is understood that it will locate a tire factory in South Norwalk, Conn. The incorporators are: Earle Banks, John Pierce and Sayer Youngs, all of South Norwalk.

While no public announcement has been made, it is stated that the moving spirit in the new enterprise is W. B. Miller, who formerly was connected with the Diamond Tire & Rub-

ber Company, at Akron, O. It will be noted that his name does not appear in the list of incorporators.

TO MANAGE FIAT SALES.**Well Known Alco Man Takes Charge of That Department for Poughkeepsie Concern.**

Announcement is made in New York City that C. Arthur Benjamin has been appointed manager of sales for the Fiat Automobile Company, with headquarters at the factory in Poughkeepsie, N. Y. It is understood that while his work will embrace the entire country, H. T. Clinton, who has been with the Fiat company for some time, will act under him in the district east of Chicago.

Mr. Benjamin is well known in the industry, and has a wide reputation for his ability as a salesman. For a number of years he was sales manager for the American Locomotive Company, before that concern gave up the manufacture of Alco cars last year. Since that time he has been engaged in closing up the Alco affairs and looking after its service department.

ADOPTS NEW POLICY.**Goodyear Tire & Rubber Company Retires from the Retail Selling Field.**

Another tire concern has retired from the retail selling field, this being the Goodyear Tire & Rubber Company, Akron, O., which made this announcement prior to April 1, at which time the new policy went into effect. Hereafter, no car owner will be able to purchase a casing over the counter in any of the company's 60 branch houses throughout the country.

In arriving at this decision the Goodyear company follows the example which was set in 1911 by the United States Tire Company, soon after the consolidation of the constituent companies which go to make up that concern. The branches will conduct a wholesale business only, leaving the retail field open to competition among dealers.

ANOTHER KNIGHT MOTOR.**Company Formed in Cleveland, O., to Produce Engines for Low Priced Cars.**

According to reports from Cleveland, O., the Knight Engine Company has been organized in

that city for the purpose of producing motors of the Knight sleeve valve type, for use in cars selling for about \$1500. It is understood that the incorporators include Charles Y. Knight, inventor of the motor; L. B. Kilbourne and F. E. Lonas, representing the Knight interests, and a number of Cleveland capitalists.

Such Knight motors as are now on the American market are produced under license by the concerns making the cars in which they are utilized. It is stated that Mr. Knight has been seeking for an opportunity to produce engines for sale to the American trade, and this appears to be an effort along this line.

MOTOR COMPANY CHANGES HANDS.

Pittsburg Model Engine Company Acquires Property of Model Gas Engine Works.

Announcement is made to the effect that the Pittsburg Model Engine Company has purchased the property of the Model Gas Engine Works and that work will begin shortly upon the erection of a new factory at Pittsburg, Penn. The Peru, Ind., plant will hereafter be operated as a branch of the Pittsburg factory.

The management will remain practically the same as that of the old company, and with increased manufacturing facilities the company will be in a better position to serve its customers than heretofore. Until the Pittsburg factory is completed all letters should be addressed to the Peru office.

The officers of the new company are as follows: President, W. J. Strassburger; vice president, E. A. Myers; treasurer, J. F. Keenan; secretary, J. W. Littlefield. It is stated that the new plant will be completed in July.

RECEIVER APPOINTED.

Detroit Trust Company Is Trustee in Bankruptcy for Herreshoff Motor Company.

According to a report published in Detroit, Lee E. Joslin has appointed the Detroit Trust Company trustee in bankruptcy for the Herreshoff Motor Company which, according to its schedule, has total liabilities amounting to \$142,819.84 and assets of \$321,821. An appraisal of the assets has not as yet been made.

Of the total liabilities set down in the schedule, \$85,620.03 is secured and \$52,863 unsecured. The custodian has appraised the machinery, tools and equipment at \$4263 and merchandise at

\$31,358. An appraisement is being made with a view of ascertaining whether the plant should be operated or not.

EMPLOYEES PRIVILEGED.

Production Manager Richman of Cole Motor Car Company Employs a Novel System.

Production Manager J. F. Richman of the Cole Motor Car Company, Indianapolis, Ind., is very popular with the employees because of the method of supervision he utilizes. He explains his success with the workmen by stating that he has always made it a practise to give every man who is a subordinate the privilege and opportunity of expounding his version of the subject that is uppermost in his mind.

"Invariably his troubles to him are important", says Mr. Richman, "and by allowing him to free his mind he goes away feeling that he has been heard and accorded a square deal. This manner of handling employees is generally satisfactory and has a strong influence on the men. The fact that it is their privilege to come to the manager when occasion arises, makes them feel that they are treated as real men; consequently, they continue at their work better satisfied and remain loyal to the company".

ANOTHER FORD PLANT.

Canadian Demand Results in Plans for New Factory at London, Ont.

Owing to the fact that the Walkerville factory is unable to keep up with the demands made upon it by Canadians, the Ford Motor Company of Detroit has decided to establish another branch at London, Ont. A Detroit architect is now working on the plans for a four-story structure which will be modern in every respect. The proposed plant will be utilized as an auxiliary, it is stated, where cars may be assembled and stored and repairs made.

GMC DECLARES DIVIDEND.

Will Pay 3.5 Per Cent. on the Preferred Stock on May 1.

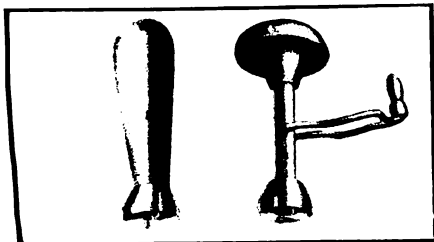
The board of directors of the General Motors Company at a recent meeting in New York City declared the semi-annual dividend of 3.5 per cent. on the preferred stock of the company, payable May 1.

NEW ACCESSORIES FOR THE MOTORIST.

MOSSBERG VALVE GRINDERS.

Made in Two Styles, One Particularly for the Ford Motor.

The Frank Mossberg Company, Attleboro, Mass., is manufacturing two types of valve grinders for the model



T Ford motor. That at the left in the illustration is termed the No. 600 and is designed after the repairman's favorite method of grinding valves, that of utilizing a rolling motion between the flattened hands. The Mossberg tool is so shaped that it fits the hand easily. It is made of hardened steel with wooden handle and is 4.5 inches high.

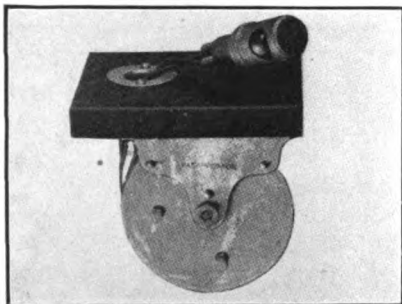
The Ford valve grinder No. 605 is constructed to permit of swinging a 90-degree circle, has a body of high grade metal and a wooden top. It is designed especially for the Ford owner and is a very practical tool for the person who cares for his own machine. Both grinders are provided with pins which engage with recesses in the valve heads.

SMITH DUPLEX LAMP.

A Combination Dash and Inspection Light with Winding Spool.

Experienced motorists realize it is a dangerous proceeding to utilize a naked flame about the car when inspecting or making an adjustment at night when on the road or in the garage as more or less combustible vapor is present.

An electric lamp makes for safety, and among the late types of inspection members is the design marketed by J. W. Andrews & Co., Chicago. The Smith Duplex, as it is termed, is a combination unit, in that it combines the qualities of a regular dash light and a trouble lamp. The lamp is fitted into a socket in the dash, and, when the use of an inspection light



is required, it may be removed easily and quickly. Sufficient length of high grade flexible cable is provided to permit use of the light at the rear of the machine if desired.

One of the features of the Smith Duplex is the method of carrying the cord. Instead of storing the equipment in the tool box as in conventional practise, the wire is wound upon a spool placed behind the dash. The winding member is neat and compact, as will be noted by the accompanying illustration. The Smith Duplex lamp comes complete with instructions for installing and the work may be performed easily.

CARBONOX.

A Carbon Remover That Is Inexpensive and Practical.

Carbon is present in the cylinders of the internal combustion engine, the amount of the deposit depending upon the grade of lubricant and the quantity utilized. Formerly it was deemed necessary to dismantle the motor to remove it, but in these days it can be displaced easily. The North-



western Chemical Company, Marietta, O., has been marketing for some time a carbon remover called Carbonox, a fluid, which is injected into the cylinders. The preparation does not dissolve the carbon, but attacks the charred oil that fastens the flakes of carbon to each other and to the cylinder, piston head, etc.

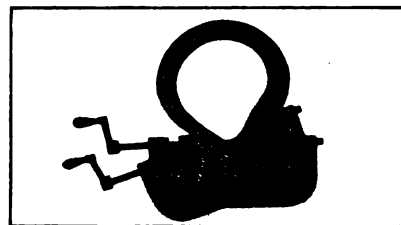
The method of use is simple. Carbonox comes in a can having a detachable spout and by means of the latter the fluid is injected through the spark plug opening. The result is that the carbon is loosened and is blown out in the exhaust. The amount present may be noted by holding a sheet of paper under the outlet. One of the qualities of Carbonox is that it provides an inexpensive method of keeping the cylinders free from carbon, as the cost a cylinder is but a few cents.

Attention is specially directed to the April 25 issue of The Automobile Journal, which will be the annual overhaul and equipment number. An effort will be made to present in this department descriptions of equipment making for economy of time and labor. Manufacturers' data must be in the hands of the editor not later than April 18 to insure its use.

CALNAN TIRE REMOVER.

Is Adapted to All Types of Tires and Rims and Ford Shoes.

James P. Calnan, West Upton, Mass., is manufacturing the Calnan tire remover, which is held to be a



very practical tool in that it is designed to loosen any type of tire or rim. One of the qualities of the construction emphasized is that it will fit all sizes.

The tool is operated from the front of the wheel, either when removing or replacing a casing, and it locks automatically, enabling the user to employ both hands if necessary. The equipment also includes a tire removal tool (not shown), which is provided with a ball end that is placed on the ground, and the other end is inserted between the shoe and the rim. By turning the wheel the tool separates the casing from the rim.

RUSCO FORD BRAKE LINING.

Constructed for Service Brake and Is Free from Metal.

While it is a well known fact that the output of the model T Ford fly-wheel generator is very large, the efficiency of the current producer is affected by metal particles, as these short circuit the dynamo. As the service brake band is located in practically the same housing, it is important that it should be lined with a friction material free from any metal.

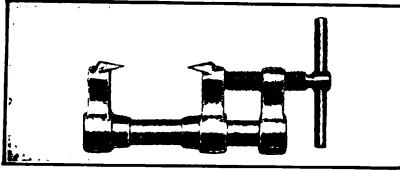
The Russell Manufacturing Company, Middletown, Conn., is producing a special lining for the Ford brake, which is constructed of long fibre asbestos without wire or other metal. It comes in exact lengths for the brake, in a neat box, and sufficient rivets are provided for securing the material to the drum. The Rusco lining has a very high coefficient of friction and is very durable.



KNOWLSON SPRING SPREADER.

Chas. E. Miller Marketing an Inexpensive Practical Tool.

In these days of refinements more attention is being given to details formerly neglected. Few motorists



consider the springs as requiring attention, but it is a well known fact that these members should be lubricated; that is, the bearing surfaces of the leaves. The old method of cleaning and lubricating consisted of prying the leaves apart with a cold chisel or other convenient tool.

Chas. E. Miller, 97-103 Reade street, New York City, is marketing the Knowlson spring leaf spreader, which is easily operated and adjustable to any size spring. One of the qualities of the device is that it is not necessary to loosen the spring clips. As will be noted by the illustration, the tool has a screw member provided with a point. By rotating the screw the leaves are forced apart, enabling the introduction of the lubricant. The tool is made of drop forgings, nickel plated and polished, and weighs but 15 ounces. It can also be used to make a temporary repair to a broken spring.

J. & B. FUEL SAVER.

Dash Device Automatically Controlling Extra Air to Intake.

As the efficiency of the motor largely depends upon the correct proportions of fuel and air, a number of devices for regulating the supply of air from the seat have made their appearance during the past year. The principle involved is that of admitting atmosphere when it is supposed that too large a quantity of gasoline is emerging from the jet of the carburetor, and when the motor is attaining high speeds.

The majority of the devices marketed provide for manual control; that is, the operator of the car utilizes his judgment as to the amount of air required. The device manufactured by Jones & Buckoke, 1413 Michigan avenue, Chicago, differs

from conventional practise in that the air is admitted automatically and according to the speed of the engine.

The J. & B. automatic fuel saver is located on the dash and is connected by a flexible tube to the intake manifold between the carburetor and the cylinders. The dash device contains an air valve, which opens and closes according to the varying suction which changes with the speed of the engine.

When the motor is running slowly the valve is closed, but as the speed picks up, a valve member is automatically released from its seat, and allows air to be drawn into the intake manifold, the extra atmosphere being in proportion to the requirements of the engine.

MOSCO FORD WHEEL PULLER.

Provision Is Made for Variation of Treads of Hub.

Certain types of rear axles necessitate the use of a wheel puller when it is necessary to displace a wheel from the axle. The model T Ford car is one of these and, to enable the removal of the wheel without damaging it or marring the paint, the Motor Specialties Company, Waltham, Mass., has designed the Mosco wheel puller.

As will be noted by the accom-



panying illustration, it is made to be screwed on to the hub of the wheel, and a liberal sized set screw is employed to draw the wheel from the axle. One of the qualities of the Mosco is that a simple binding screw adjustment is incorporated. This adapts the device to any variation that may exist in the thread of the wheel hub, as well as eliminates danger of stripping. The Mosco is constructed of high grade material, nicely finished, and is inexpensive.

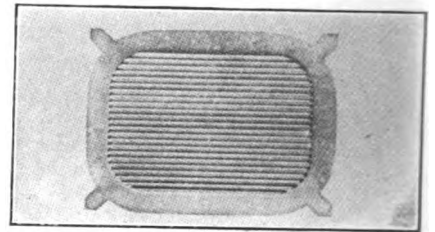
MOTOR STARTERS.

The editor of this department has received a number of letters from readers asking for information upon motor starters and lighting systems for the Ford and small machines. This subject will be thoroughly discussed in the April 25 issue of The Automobile Journal, which will be the annual overhaul and equipment number. Manufacturers of lighting and starting systems for small cars are invited to contribute data upon this interesting subject.

PYRMA ALUMINUM HEEL PLATES.

Prevent Wear of Ford Floor Mat and Are Easily Attached.

After considerable service the rubber floor mat of the model T Ford car shows signs of wear where the



operator rests his feet when driving. This is due to placing the heels on the material and the feet in a position convenient to the pedals.

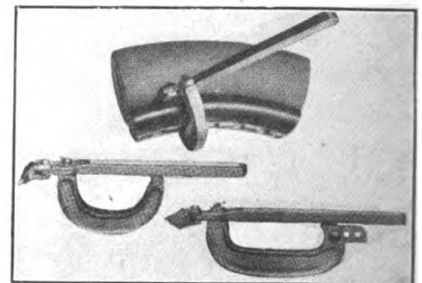
The Metallic Automobile Matting Company, Rochester, N. Y., is manufacturing the Pyrma aluminum heel plates for the Ford machine, and one of the qualities of the design is that the use of screws, rivets, etc., is eliminated when attaching the plates to the matting. The Pyrma is fitted with corners, which are bent down, placed on the mat and the positions of the holding members marked. Slits are then cut in the mat, the corner members inserted and bent to clinch. It is stated that the plates can be attached in three minutes. They are moderately priced.

HOLDEN TIRE TOOLS.

Designed for Clincher Demountable Rims and the Ford Car.

The Holden Manufacturing Company, St. Paul, Minn., is producing the Holden tire tool, which is made in standard and a special form, the latter for the model T Ford machine and shown in the lower right hand corner of the illustration. The Ford tool is made for three and 3.5-inch clincher tires.

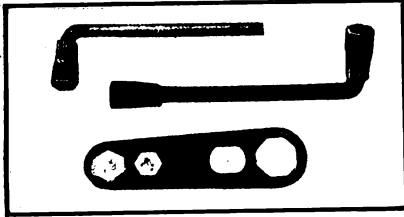
The standard is designed especially for clincher demountable rims, and it is stated that it will loosen a shoe easily, no matter if it be frozen. By turning the handle outward just past dead centre it locks, holding the bead inward, facilitating removal when the rim is split crosswise. It is adapted to 3.5 and five-inch tires, is finished in aluminum and weighs but two pounds. They are inexpensive.



MOSSBERG FORD WRENCHES.

Constructed to Remove Nuts from Cylinder Head and Hub Cap.

The Frank Mossberg Company, Attleboro, Mass., is manufacturing a number of useful tools for the model



T Ford car, some of which are shown in an accompanying illustration, these including single and double-end cylinder head socket wrenches and a hub cap member. The single-cylinder head wrench is known as the No. 620, the double as No. 625, and either of these tools makes it a simple matter to displace the nuts and replace them quickly and properly. The difficulty of reaching these nuts with ordinary tools is well known to owners. The hub cap wrench is a particularly well designed and constructed tool and like the wrenches is made of a high grade material and is inexpensive.

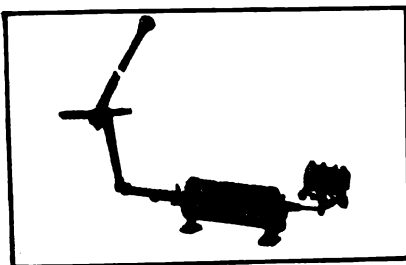
LIEBSON MOTOR STARTER.

Employs Explosion of Gas to Rotate the Crankshaft.

The Liebson Self-Starter Company, 412 Georgia Life building, Macon, Ga., is marketing the Liebson self-starter, which is held to be adaptable to any make of car, does not require skilled mechanics to adjust it and weighs less than 10 pounds.

It differs from the conventional types of motor starters in that it is operated by compression and explosion, the principle involved being practically the same as that of an internal combustion engine. A lever operates a small brass pump, to which is attached a specially constructed carburetor. In moving the lever backward, fuel from the main tank is drawn by suction through the carburetor into the pump.

At the completion of the suction stroke, the proper amount of air is mixed with the fuel, and the next forward movement of the lever compresses the mixture, sending it through a pipe into a distributor having as many outlets as there are cylinders to the engine. An ar-



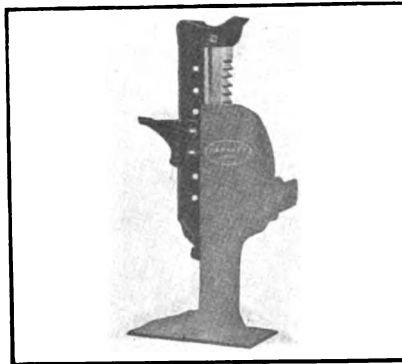
range of valves actuated by cams makes for proper distribution of the gas, which is ignited by an electric spark.

A feature of the starter is that in forcing the charge into the cylinder there is sufficient pressure to start the crankshaft revolving, and the ignition is so timed that the explosion takes place after this movement has begun. From the above it would appear that the starter combines the compressed air and explosion methods for starting.

BARRETT 1914 JACK.

New Design Has Several Practical Features of Interest.

The Duff Manufacturing Company, maker of the Barrett automobile jacks, has brought out a new design, termed the 1914. One of the qualities of the new jack is the casting integral with the malleable iron top, an adjustable lifting member, which is of advantage in that it permits using the jack where the height is less than the maximum of the regular top. The smaller top member slides and is secured by bolts. This



construction adapts the jack to all types of machines.

The pawl points are machined all around, meshing perfectly, making for a large factor of safety, efficiency and convenience. The pawl bearings are also machined. The bearings, gears and racks are constructed of a high grade carbon steel and each jack is rigidly tested before leaving the factory. A tire tool lever is supplied with all the new styles marketed by this concern.

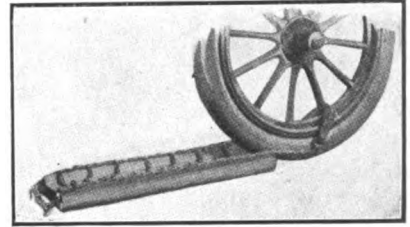
SIGNALLING DEVICES.

With the large variety of signalling devices offered the motorist and at very reasonable price, there is no reason why every car should not be equipped with an efficient signal, one that leaves the pedestrian no opportunity to state that "he did not hear the horn". During the past six months a number of moderately priced practical signals operated by electricity have made their appearance. These have been supplemented by mechanical types, eliminating the need of current, but operating in a similar manner and as productive of results.

ROHE MOTOR CAR BLOCK.

Designed to Extricate Machine from Mud, Etc., by Own Power.

In the spring of the year, when visiting the country sections, and especially after a heavy fall of rain,



the driving wheels of the machine are likely to become mired unless one be careful. Usually the driver has to engage a pair of horses to extricate the machine when ordinary methods fail.

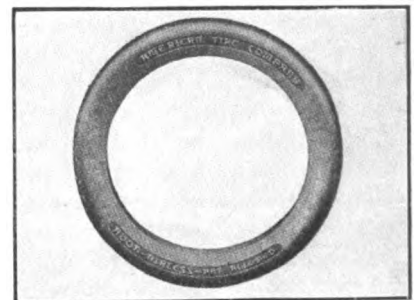
The Rohe Traction Block Company, Kenmare, N. D., is marketing the Rohe motor car block, which is designed to enable a car to extricate itself out of a mud hole or other place where traction cannot be obtained. The block is approximately 30 inches long and is placed, as shown in the accompanying illustration, with a chain attached to a strap. When power is applied the wheel in revolving draws the chain and block under it, thus providing a tractive surface.

AVON AIRLESS TIRE.

Wool Felt Employed as a Material—Many Advantages Claimed.

The American Tire Company, Montello, Mass., is manufacturing the Avon airless tire, which is designed for light and heavy trucks. It is made in both flat and round treads. The tire is the result of a series of experiments with wool felt by the inventor, and it is stated that none of the desirable resiliency of the pneumatic is sacrificed.

It is pointed out that the material utilized in the Avon tire can be subjected to enormous pressure without affecting it, as it will quickly resume its normal form. Among the advantages of the construction emphasized are: Creeping is eliminated, internal friction avoided and saturation prevented. It is obvious that wool felt is not affected by punctures nor susceptible to blow-outs. For the present manufacture of Avon tires will be confined to commercial vehicles.



MOTORIZING POLICE DEPARTMENT.

City of Detroit Places in Service Car Having Special Body for Transporting Canines.

Police Commissioner Gillespie, who is in charge of the motor department of the city of Detroit, has placed in commission the new motor dog wagon, which is fitted with a body to meet the requirements of this particular branch of the service. As will be noted by an accompanying illustration the body is partitioned by lattices, providing a number of individual compartments which are available through doors at the rear and sides of the car, making for convenience in storing the canines while in transit.

The vehicle is the product of the Commerce Motor Car Company of Detroit and is the second machine purchased by the city from this company within a year. Commissioner Gillespie states that he finds it more advantageous and



Novel Motor Vehicle Utilized by Police Department of Detroit to Transport Canines.

economical to use light vehicles, in that the unit cost permits of having two automobiles at approximately the cost of one large machine.

SPRING PREPARATIONS.

Chas. E. Miller's Big Catalogue Contains Many Suggestions for Preparing the Car.

With the appearance of spring the thoughts of motorists turn seriously to the overhaul and preparation of the car for the road. This involves, if the owner does his own work, a method that is gaining many adherents, the selection of tools, supplies and those devices which economize in time and labor. Those who are not familiar with the equipment required, as well as the experienced, will find many valuable suggestions in the annual catalogue, which is issued and forwarded free upon request by Chas. E.

Miller, 97-103 Reade street, New York City.

It contains hundreds of pages illustrating and describing thousands of parts, accessories, equipment and motoring conveniences, and the use and application of each are explained fully. The house of Chas. E. Miller was established in 1896 and it now has branches in the leading cities of the country. Having specialized for years in accessories, parts, tools, equipment, etc., Mr. Miller is entirely familiar with the requirements of the motorist and trade. A postal mailed will bring a free copy of the book above referred to. All motor car owners should have a copy of this encyclopedia.

SERVICE MEN ORGANIZE.

Managers of Detroit Plants Combine with an Idea of Improving Departments.

The service managers of the various motor car manufacturers of Detroit have formed an organization which will number from 16 to 20 members, the object being to improve the service departments of the industry. It is believed that the interchanging of ideas and benefit of experiences will be invaluable.

The officers elected are as follows: President, D. H. Haselton, Regal Motor Car Company; vice president, A. B. Hanson, Chalmers Motor Company; secretary, G. O. Baldwin, Studebaker Corporation; treasurer, Virgil Oldberg, Hudson Motor Car Company.

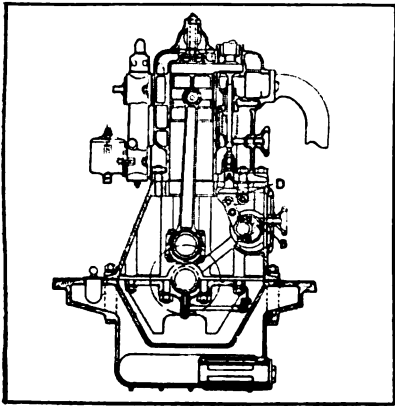
The organization has been approved by a large number of manufacturers. Mr. Haselton states that while it is too early to say just what the scope of the organization will be eventually, he believes it to be far reaching in its aims. A general understanding of the methods of handling adjustments and claims, and a policy with respect to service departments is aimed for, and a standardization of these matters and co-operation cannot but be of benefit to both manufacturer and buyer alike. It is hoped to extend the organization to all manufacturers whether located in Detroit or not.

EQUIPPING THE GARAGE.

The purchaser of a new machine who intends to attend personally to its upkeep, will find many valuable suggestions dealing with the selection of the garage equipment in the annual overhaul and equipment number of The Automobile Journal of April 25.

FEATURES OF L. U. C. VALVE MECHANISM.

A NOVEL and interesting design of valve operating mechanism is noted in the L. U. C. motor fitted to Loeb cars, manufactured by Loeb & Co., Charlottenburg, Germany. The accompanying sectional drawing and diagram of the valve cycle are practically self-explanatory.



Showing General Arrangement of L. U. C. Valve Mechanism.

It will be seen that a poppet valve of the ordinary type is used, and is acted upon by an adjustable tappet, which does not differ materially from standard practise, but varies, however, in regard to the heel piece, which is of a distorted mushroom shape.

The design differs from conventional practise in regard to tappet valve operation in the entire elimination of the camshaft and the cams. At the side of the engine, driven by silent chain, is a valve shaft D, shown in both illustrations. This is in reality a miniature crankshaft having eight crank pins with a four-cylinder motor. Each of these pins actuates a connecting link C.

To obtain the same effect as a cam, that is, to give the necessary "dwell" to the valve in both closed and open positions, the connecting link C acts upon the heel of the tappet through the rocker B. This rocker, at one end, is pivoted to the crankcase; at the other end it is coupled up to the connecting link C.

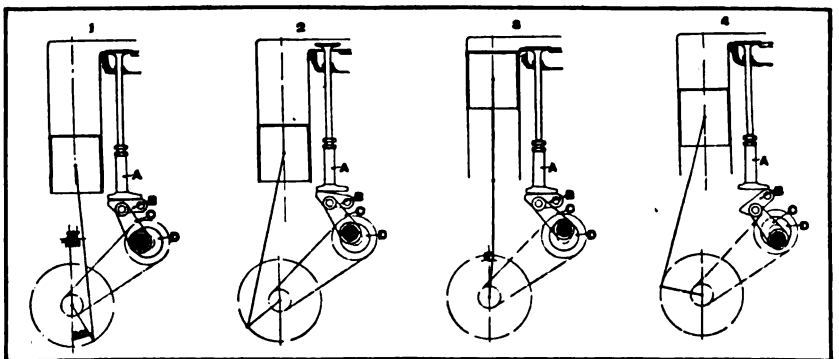
Referring to the diagram of the valve cycle (the inlet only is shown), it will be noted that the heel of the tappet is never entirely out of contact with the rocker B, but that, during the whole of the time when the valve is closed, one end of the heel rests upon the rocker just over its pivot pin. While the valve tappet remains motionless during a large portion of the cycle of the motor, the link C continues to be moved, being coup-

led to the crankpin of the valve shaft, the free end of the rocker being moved with it.

When the time approaches for the valve to be opened, the rocker is gradually brought into a horizontal position under the heel of the tappet. There is no sudden blow of contact as with a cam, but an easy and gradual commencement of the lift. The period of "dwell", while the valve remains open, depends upon the relative shapes of the top of the rocker B and the bottom of the tappet heel, so that it is possible to simulate exactly the motion given to a poppet valve by means of cams, or perhaps to improve on it.

The advantage claimed for this simple and ingenious valve mechanism is the elimination of noise, and it would appear that, even though a valve movement be obtained similar in effect to that provided with cams on super-efficient engines, the valve gear should be almost, if not equally, as quiet as a movement giving a slow lift and drop. There is, of course, the blow of contact between the head of the valve tappet and the valve stem, but this, it is generally admitted nowadays, is not of itself productive of any noise worth mentioning, for in the average poppet valve engine any noise which exists is usually caused by the cam striking the lower end of the tappet. In the L. U. C. engine this source of noise is eliminated by what might be termed a rolling contact, which always occurs between the heel of the tappet and the rocker B.

Referring to the cross sectional view of the motor, it will be noted that under the valve shaft is provided a crescent shaped trough in which oil is retained as it is thrown transversely by the large ends of the connecting rods, and into which the valve link C dips at each revolution. A feature is the accessibility of the valve shaft.



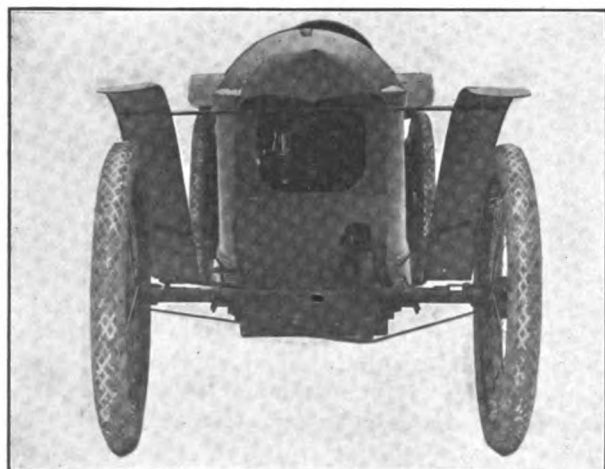
Four Diagrams of the Exhaust Valve Cycle of the L. U. C. Motor; the Reference Letters Are the Same as in the Sectional View; Figure 1 Shows the Valve About to Open; 2, Fully Open; 3, Just Closed; 4, at Rest During Compression Stroke.

WITH THE CYCLECAR MANUFACTURERS.

Eight Concerns Making Delivery and Others Have Production Plans Well Under Way---Details of Morse Front Drive Model---Other New Designs.

CONDITIONS within the cyclecar branch of the automobile industry are rapidly assuming definite shape, although few concerns have as yet begun production on anything like a quantity basis. Several companies state that they do not intend to market machines in large numbers until they have had full opportunity for studying the situation. Among automobile engineers it is regarded as necessary to allow practically a year for the development of a car. The American cyclecar cannot be considered as quite a year old as yet, although several designers have been experimenting for much longer periods of time than others.

From what are believed to be reliable sources



Front View of Morse Front Drive Model.

it is learned that at least eight manufacturers actually are engaged in the delivery of machines, although in most instances this means that the cars are going to dealers and are to be regarded as demonstrators. The Imp Cyclecar Company of Auburn, Ind., is generally conceded to have been the first to place cars in the hands of dealers, deliveries having been begun sometime in September. Reports indicate that the present rate of production is 30 a day.

The Mercury Cyclecar Company, Detroit, is said to be producing five machines a day and it is stated that this number will be increased to 20 within a very short time. The Scripps-Booth Cyclecar Company of the same city has material ready for a large number of cars; has already

made some shipments, and expects to be producing at the rate of 20 a day this month.

In Indianapolis, the Comet Cyclecar Company is reported to have made its first shipment recently and to be in a position to begin quantity production at once. The Merz Cyclecar Company also is reported as having made several shipments to dealers, and plans are said to be well advanced toward quantity production.

The Zip Cyclecar Company, Davenport, Ia., according to Manager R. W. Phelps, is making shipments to dealers, and has its factory force well organized. The Dayton Cyclecar Company, Joliet, Ill., is reported to have shipped several machines and to have a large plant in operation. Similar reports are made with respect to the Dudley Tool Company, Menominee, Mich.

Other concerns which are stated to have production plans well underway, and to be in a position to begin deliveries in the near future, are: The American Cyclecar Company, Bridgeport, Conn., maker of the Trumbull, and the Twombly Car Corporation, New York City, Twombly.

It is probable that this list by no means includes all of the companies which are, or soon will be, in position to make delivery of demonstrating cars, at least. The reports are presented, in keeping with the announced purpose of The Automobile Journal to supply such information and facts as it is able to secure respecting this situation. It will be understood, however, that this magazine assumes no responsibility in making public these statements, but acts solely in an effort to place its readers in a position to make their own deductions concerning the ability of the manufacturers to meet the demand for cars. As a matter of fact, it cannot be expected that many machines will be placed in the hands of owners for at least another month or two.

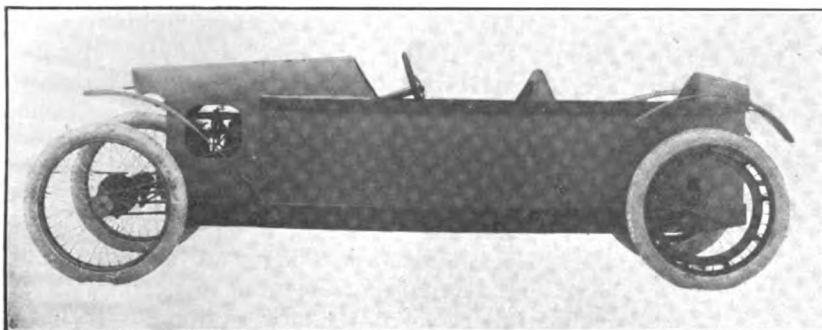
MORSE FRONT DRIVE.

Additional Information Respecting the New Design Announced in Pittsburg.

Mention was made in the last issue of the Morse front drive car, made by the Morse Cyclecar Company, 519 South Lang avenue, Pittsburg, Penn., but little information concerning the machine was available at that time. The de-

signer is Frank H. Morse, an automobile engineer, who is stated to have produced his first successful car in 1902, and since that time to have

versal joint within the steering knuckle is in line with the steering pivot and its outer end is connected to the face plate of the hub. This permits of steering as well as driving the front wheels.



Side View of the Morse Front Drive Cyclecar, a New Product, Which Is Made in Pittsburg.

been connected with some of the largest automobile manufacturers in this country. It is not understood that quantity manufacturing has begun, although the machine shown has been subjected to severe road tests and is believed by the designer to be an entirely practicable construction.

The main feature of the Morse, which is a true cyclecar, lies in the front drive, which system is said to have been thoroughly tried out on trucks carrying loads up to 10 tons as early as 1906. It is maintained that it can be used for driving all four wheels, although this is not held to be necessary in a machine of this weight and power. The car has a wheelbase of 105 inches and tread of 36. The two passengers are seated tandem. The weight is given as 450 pounds.

The motor is a Spacke, two-cylinder, air-cooled, V type unit, with bore of 3.5 inches and stroke of 3.67. Ignition is by Atwater Kent Unisparker, six dry cells being held to be sufficient for 3000 miles of service. The carburetor is a Schebler. The transmission also is of the Spacke manufacture, a planetary type, affording two speeds forward and reverse.

As will be noted, the motor is placed in front, and a chain communicates with the planetary transmission. Another chain runs forward to the front axle, giving the same form of drive as with a motorcycle. The front axle has a solid drive shaft within the tubular axle. The wheels are pivoted on enlarged steering knuckles, the steering pivots being located in the centre of the wheel plane. A uni-

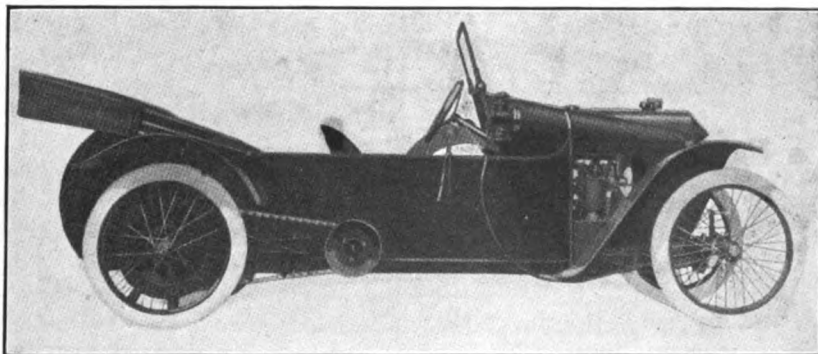
The designer states that this gives a very simple drive, highly efficient, and reduces skidding to a minimum. He adds that as long as the car is going straight ahead, which is about 95 per cent. of the time, the universal joints have no work to do, and that at low speed, when turning corners, there is not much work on the joints. He says that the solid drive to the two front wheels seems to act all right, doing away with the differential.

The springs are of the cantilever type. Brakes are applied both front and rear, those at the rear entering the V belt pulley, while the front brake acts on the planetary transmission. The wheels are of wire, carrying 28 by three-inch tires. The body is of steel or aluminum, the latter being rated at a slight extra cost, the advantage being in about 50 pounds less weight. Equipment includes a horn, three lamps and tool kit.

DETAILS OF THE ROCKET.

A True Cyclecar Which Early Came into Prominence Because of Road Tests.

One of the first American cyclecars to undergo road tests, and perhaps the first to make a long distance cross country run, was the Rocket, made by the Scripps-Booth Cyclecar Company, Detroit, which concern also produces the Packet, a cyclecar package delivery wagon fitted to the same chassis. In the latter part of September



The Rocket Tandem Model Now Seats the Driver in Front and Employs Shorter Belts.

one of these machines left Detroit for a 1000-mile tour of three states, visiting points in Ohio, Indiana and Illinois before returning to the fac-



Saginaw Cyclecar Breaking Roads in the Vicinity of the Company's Factory.

tory. Two persons were carried on this trip.

While in the main this original machine presented practically the same appearance as that which is illustrated herewith, it may be stated that the driver was located at the rear, following the example set by the Bedelia of France, and that a somewhat longer belt drive was utilized, the forward pulleys, and, of course, the jackshaft, being located immediately behind the engine in front of the forward seat. At the conclusion of the test it was stated that the belt drive had acquitted itself most creditably and that a book could be written respecting its merits.

It will be seen that the car is a tandem seater. At one time it was announced that the purchaser might have the option of front or rear location of the driver. This option does not appear in the latest catalogues. The wheelbase is 100 inches, the tread 36 and the road clearance nine. The weight is given as 750 pounds.

The motor is a two-cylinder, air-cooled, V type unit, with bore of 3.5 inches and stroke of 3.66, giving a piston displacement of approximately 70 cubic inches, which, with the weight, places the machine in the true cyclecar class. The maker rates this engine at 10-12 horsepower at normal speeds and 15 at 2600 revolutions a minute. Ignition is by the Atwater Kent Unisparker system, and carburetion by a special Schebler.

The clutch is of the disc type, embodied as a part of the special Scripps-Booth planetary transmission, which is made in a unit with the jackshaft. Front pulleys, eight

inches in diameter, take V belts transmitting energy to pulleys, 15.75 inches in diameter, on the rear wheels, and the total reduction from the motor to the rear wheels is given as 5:1. Adjustable belt tighteners are fitted. The springs are quarter-elliptic. Brakes are internal expanding, Raybestos lined, on the rear wheel hubs. The front axle is a special Scripps-Booth I beam drop forging, heat treated, and the rear axle is tubular. The wheels are of wire, carrying 28 by three-inch tires.

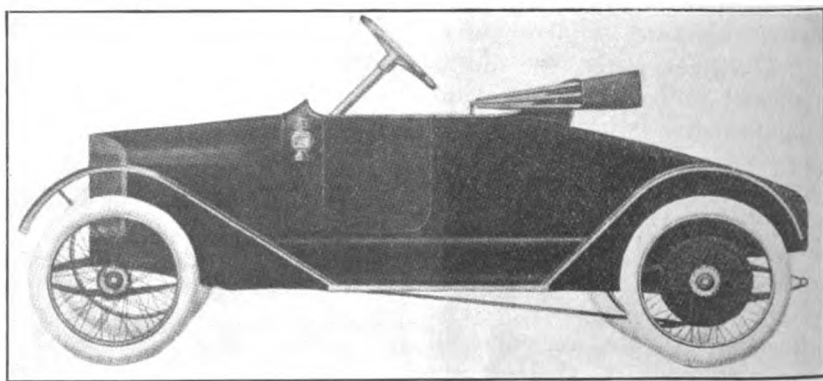
The body is of metal, of streamline design, with high sides and two doors on the right. The seats are 22 inches wide and 15 deep, with 30 inches leg room. Standard equipment includes the windshield, three lamps, horn and tool kit, while a patented one-man top, with side curtains and irons, and a speedometer are listed as extra.

The company states that it is in a position to deliver these cars in quantity, and invites prospective dealers to visit the factory and make every investigation as to what the company is doing.

SAGINAW ROADSTER TYPE.

Specifications of True Cyclecar Produced by Well Known Boat Manufacturer.

The Valley Boat & Engine Company, Saginaw, Mich., has been producing motor boats for a number of years, and is well known in that industry. Some time ago it was announced in these columns that this concern was to engage in the production of cyclecars, and this is the first opportunity that has been presented to illustrate the machine and call attention to its specifications. The photograph reproduced herewith shows the car breaking out roads in the vicinity of the factory in Saginaw.



The Liberty Roadster, Designed by Joseph A. Anglada, a Well Known Consulting Engineer.

The machine is a true cyclecar of the roadster type, with wheelbase of 100.5 inches, tread of 36 and road clearance of 8.5 inches. The weight is given as 650 pounds. The motor is a two-cylinder, four-cycle, air-cooled, V type unit, with bore of 3.375 inches and stroke of 3.9, being rated by the maker at 9-12 horsepower. Ignition is by Atwater Kent Unisparker. Lubrication is by splash, with pump circulation. The carburetor is an automatic float feed type.

Transmission is by friction discs, giving unlimited speeds forward and reverse. Drive from the jackshaft is by two 1.125-inch V belts of leather and steel, which are claimed to be stretchless. Both axles are tubular, 1.5 inches in diameter. Springs are quarter-elliptic, cantilever type. The foot brake is external contracting on the jackshaft, with extra large braking surface, lined with Raybestos. The friction transmission is employed in reverse as an emergency brake. The wheels are of wire, carrying 29 by 2.75-inch tires.

The machine shown is a tester, and does not present the complete equipment. The body is of the streamline design, with cowl dash. The driver is seated at the left, with centre control levers. The equipment includes a top, one-piece ventilating windshield, electric horn, two parabolic electric headlights in the front fenders fitted with dimming attachment for city driving, tail light, 60-mile Stewart-Warner speedometer, 60-ampere storage battery, tire pump, repair kit, etc.

ANGLADA'S LIBERTY MODEL.

Construction Details of Machine Designed by Well Known Consulting Engineer.

Announcement has been made in these columns of the organization of Liberty Motor Company of New York City by Joseph A. Anglada to produce the Liberty cyclecar, designed by him. Mr. Anglada is well known in the industry as a consulting engineer, inventor and designer. He is president of the company, while the other officers are: Secretary, C. S. Ackley of the McKiernan-Terry Drill Company, New York City, and treasurer, A. W. Drake, a coal operator in Hazelton, Penn., and formerly head of the Harvard Electric Company. It is stated that a permanent factory will be established in the near future, but for the present some 200 cars are to be produced in a temporary plant on Perry street, New York City.

The machine is a true cyclecar of the road-

ster type, seating its two passengers side by side. The wheelbase is 92 inches and the tread 42. The weight is about 550 pounds. The motor is a two-cylinder, air-cooled, V type unit, the dimensions of which are not stated, but the rating given by the maker is 15 horsepower at 2500 revolutions a minute. Ignition is by generator and battery, and the motor may be started from the driver's seat.

Transmission is by friction wheel engaging with the rear face of the flywheel, and four forward speeds and reverse are afforded. Final drive to the rear wheels is from the friction wheel shaft by belts. The 16-inch hand wheel is placed at the left, and the brake and change speed levers are located in the centre. The brakes are of the railway type, engaging in grooved belt pulleys on the rear wheels.

The body is practically one piece of sheet steel, and is of the so-called French torpedo type, with gunboat stern. The seats are individual, each 18 inches wide and 18 inches deep. There is a baggage compartment in the stern, 24 by 35 inches and 15 inches deep. The equipment includes a mohair top, windshield, two electric headlights and tail light, with storage battery and kit of tools.

FOREIGN MARKET CONDITIONS.

Current Reports by American Consuls to Be Placed on File at Various Cities.

Current reports by American consuls on market conditions for American motor vehicles will be placed on file by the Bureau of Foreign and Domestic Commerce according to the following schedule for examination: Chamber of Commerce, Indianapolis, Ind., March 30 to April 10; Board of Commerce, Detroit, April 13 to 24 inclusive; Chamber of Commerce, Buffalo, N. Y., April 27 to May 8; Chamber of Commerce, Cleveland, O., May 11 to 22 inclusive; branch office of the bureau of Foreign and Domestic Commerce, Association of Commerce, New Orleans, May 27 to June 13; Appraisers' Stores building, Washington and Centre streets, San Francisco, Cal., June 17 to 27 inclusive.

The reports are in manuscript form and contain much valuable information, covering 15 countries in Europe, also Canada, Honduras, Brazil, the West Indies, Peru, Uruguay, India, Japan, Arabia, Ceylon, Java, the Straits Settlements in Asia, Portuguese East Africa, South Africa, Australia, Madagascar, Tasmania and the Society Islands.

MECHANICAL NOTES FOR OWNERS.

Practical Method of Constricting and Removing a Piston Ring Expanded in a Combustion Chamber---Maintenance of a Timer---Novel Windshield Ventilator.

THE removal and replacement of pistons and rings rarely give trouble if the work is performed properly, but an exception was noted by the writer recently. The owner of the car decided to replace a pair of cylinders with new, and ordered pistons and rings for the casting. Due either to carelessness at the factory or to the pistons moving in transit, both slipped upward until their heads came in contact with the top wall of the combustion chamber. Naturally the top ring expanded and when an attempt was made to remove the pistons it was found that the ring had caught.

Owing to the limited space it was found to be impossible to insert any type of clamp to compress the ring, although several methods and dif-

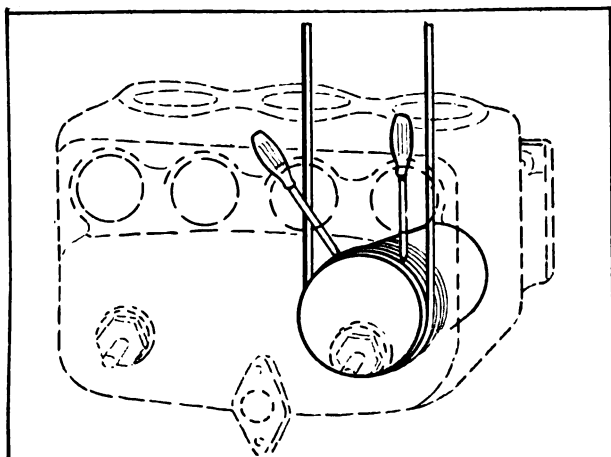


Fig. 1—Utilizing Thin Metal Band to Compress Ring When Piston Head Slipped into Combustion Chamber, Preventing Removal from Cylinder.

ferent kinds of material were employed. The owner was advised by the foreman of a large repair shop to utilize piano wire, inserting it through the valve plug openings and passing it under and around the piston and ring. This method was employed by the repairman, who stated that sometimes it required considerable time to so locate the wire that it would compress the ring diametrically opposite the slot.

The owner after repeated trials with the wire gave it up, as it was found that the wire either slipped when tightened or became lodged between the ring and the chamfer in the cylinder. The problem was finally solved as outlined at Fig. 1. By making a thin strip of metal of ap-

proximately the same width as the piston ring and passing it through the valve plug openings, it was a simple matter to locate the band in the desired position; that is, diametrically opposite the slot. One person drew the band taut and exerted an upward pull which forced the ring on its seat or groove in the piston. Another person utilized a pair of screw drivers, compressing the ring at the points indicated in the drawing. With the band and screw drivers, a three-point compressional effect was obtained, and it was a simple matter to withdraw the piston back into the cylinder proper. The other cylinder was treated in a like manner and the entire operation consumed but a few minutes. Before beginning the work the ring was turned so that the slot was on top, or between the screw driver points.

WIRING COMMUTATORS.

Commutators or timers are not as generally used as formerly, for with the advent of the dual type of magneto, providing battery ignition for starting and as an auxiliary on the same set of plugs, manufacturers of motors eliminated them, although they are found on some high priced modern machines.

Timing the ignition with a commutator is **very simple**, but many owners do not understand the principles involved, and when trouble is experienced generally consult the expert. The following suggestions for timing and rewiring a commutator will be of value to the novice either in the overhaul or in case of ignition trouble on the road.

It is not necessary to locate the piston accurately in case the timer has been removed for repairs, as the method outlined at Fig. 2 C will eliminate the trouble. Assuming that the timing is correct; that is, the timer is set properly: mark a slot in the timer shaft and another on the coupling member. The two marks should coincide as shown in the drawing.

Marking the Timer.

If the timer has been displaced, all that will be necessary is to make sure that the piston of the first cylinder is on compression or about to fire. This position will be indicated by the marks referred to since the roller or other contact making member of the commutator makes

but one complete revolution to obtain the four contacts with a four-cylinder motor. To simplify matters the marks could be placed opposite or

nected. This should be done before the roller member is located.

The work of rewiring timers should be carefully performed. While the leads do not carry any high-tension current and do not require as careful insulation as the spark plug cables, they are subject to the action of oil, which breaks down the insulation. As the timer housing is rotated a certain number of degrees to obtain an advance and retard of the spark, it is important that the wires be so connected to the timer that they will not be brought into contact with each other or with metal.

The sketch at A depicts a simple method of carrying the wires and at the same time it separates them from each other. The device is shown at B and comprises a circular piece of fibre about .25 inch thick, through which are bored four holes. Both the sketches A and B show the parts marked according to the firing order of the motor, which in this instance is 1-2-4-3, and with the timer shaft rotating anti-clockwise. By marking the timer housing it is a simple matter to replace the wires.

Care of Timers.

Commutators should receive care, as their parts are subject to friction and wear. The cover should be displaced and the interior flushed with gasoline to remove particles of metal and foreign elements that collect. If a timer be examined after considerable service it will be noted that the lubricant used is much discolored. The foreign elements set up considerable resistance to the passage of the primary current and the re-

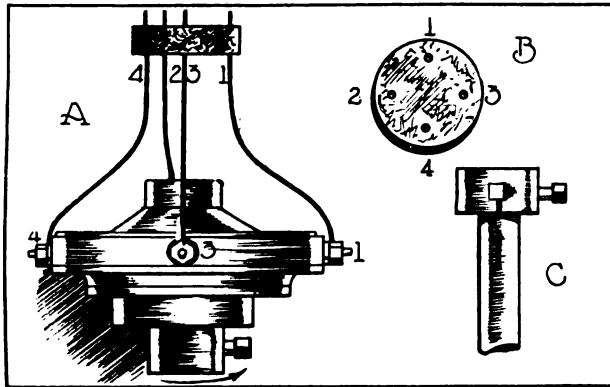


Fig. 2—Wiring of Timers: A. Numbering and Separating Leads by Disc Shown at B; C. Marks to Simplify Correct Replacement of Commutator.

in line with the contact block of the No. 1 segment of the timer.

Utilizing the Piston Travel.

If the set screws or locking nut retaining the contact lever of the timer should work loose, and no marks have been made as above described, it will be necessary to utilize the piston travel. Turn the starting crank and watch the inlet valve of the first cylinder (that nearest the radiator). The valve starting to lift will denote that the piston has begun the intake stroke and is moving downward. The crankshaft should now be rotated until the stroke is completed, and another half-turn given until the piston moves upward or completes the compression stroke. This will be indicated by the resistance in cranking. Place the piston on top dead centre. This may be determined by passing a wire through the petcocks if they are so located as to give access to the combustion chamber, or by removing a valve cap and inserting the wire through and into the chamber. Another method is to remove the crankcase, but this involves considerable trouble.

Timing by Piston.

After locating the piston on top dead centre, rotate the flywheel slightly until the piston has begun to move downward. The distance necessary will vary with the design of the motor, but .25 inch will serve in the absence of the maker's instructions. Next attach the timer, and rotate the adjustable coupling until roller of the lever is just making contact with one of the metal segments. Tighten both set screws or other locking members very tight. In doing this work it should be borne in mind that the spark lever should be fully retarded and the linkage con-

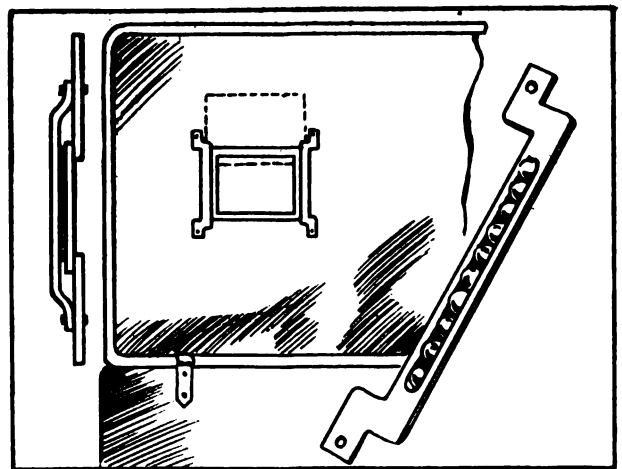


Fig. 3—Novel Windshield Ventilator Utilizing Form of Ball Bearings.

sult is that the coil units have to be adjusted to utilize more current. After cleaning the working parts they should be lubricated with a light

oil. Grease and vaseline are used, but the best results do not obtain with these heavy bodied lubricants.

NOVEL VENTILATOR.

The difficulty of obtaining a clear vision of the road when operating in stormy weather with the windshield up has been avoided in this country by the use of the rain vision type, which permits of so adjusting the upper glass as to permit of a view of the road without exposing the occupants of the front seat to the weather.

Practically the same results are obtained in the Goslett auto-ventilator, an English attachment for the windshield, a description of which was given the writer by a motorist who formerly resided in England. The device is shown at Fig. 3, the larger sketch showing its application to the windshield proper. It consists of a window which may be moved upward to obtain various openings, these, of course, being limited by the size of the window.

One of the interesting features of the device is the use of balls on which the window slides. The small sketches give an idea of the construction of the supports which are attached to the larger glass by drilling and clamping. The window is placed next to the windshield and the proper pressure is maintained by the balls. It is stated that the window is moved with little effort and that it will remain as placed without any fastening, on account of the pressure maintained. It is said that there is a large number in service and that they are generally fitted to the tonneau windshield. When fitted it is held not to detract from the appearance of the windshield. The Goslett device is marketed at a reasonable cost.

SPLICING CABLES.

If it becomes necessary to splice a high-tension cable, the wire of each section should be bared sufficiently to permit of making a good twist of the ends. The part is next soldered. As the high-tension current will take the path having the least resistance, the bare wire can be protected by covering it with some form of plastic tire cement, then wrapping the part with friction tape.

CARE OF MAGNETO TERMINALS.

To obtain maximum efficiency from the magneto its terminals and those of the transformer coil must be kept clean and tight. With the type

of instrument providing dual ignition the battery current is carried to the breaker box, where it is interrupted by the breaker mechanism, although there are exceptions as in the Simms magneto for example.

If the leads to the breaker box are loose considerable trouble may be experienced in starting on the batteries. If oil or grease has accumulated around the terminals, remove the wire, etc., and clean with gasoline, noting if any of the strands of wire are loose. All wires should be soldered to the terminals and the latter so placed that there is no opportunity for them to come in contact with the metal of the breaker housing. The writer noted a case recently where an owner was delayed over two hours trying to start the motor. The trouble proved to be a defective connection at the breaker box.

VEHICLE LIGHTING IN NEW YORK.

Highway Law Amendment Provides for Lights Outside of Cities, Etc.

An amendment to the highway law of New York State provides that all horse drawn vehicles in use on the highways, unless loaded with hay, shall carry lights at night, provided that they are in use outside of large cities where the street lights are not more than 500 feet apart. This provision, however, is expected to insure the carrying of lights at night by practically all vehicles, and is regarded as a distinct advantage toward making traffic safer in the country sections.

JUDGE FAVORS MOTORISTS.

Holds That City Council Cannot Specify Time Car Is Left Standing.

When the city council of Des Moines, Ia., enacted an ordinance that prohibited an automobile standing at a curbing more than 20 minutes, there was rejoicing by those who did not own vehicles, and consternation followed when the police arrested a number of citizens who sinned to the extent of a few minutes. When the defendants appeared before Judge Utterback in the police court he discharged them claiming, as he interpreted the law, the legislature did not delegate the city council the authority to specify what period of time a car should be left standing at a street curbing. Now the citizens owning machines have somewhat regained their composure and the advocates of the ordinance are correspondingly depressed.

THE BATTLE OF NANTUCKET.

Massachusetts Legislature Is Asked to Prohibit Motor Vehicles Entirely.

The little island of Nantucket, off the coast of Massachusetts, and a part of that commonwealth, already has a law prohibiting the use of automobiles during the summer months. No one thought of violating this prohibition during the winter months until last fall, when Clinton S. Folger, mail carrier, bought the Overland car shown in the accompanying illustration. Readers of *The Automobile Journal* are familiar with the reception tendered Mr. Folger when he arrived from the mainland with his Overland. One or two cases against him are pending in the superior court, on appeal, he having been fined in the police court.

At last Mr. Folger was forced to hire a horse to haul the car through the streets of Nantucket, but on the state roads elsewhere on the island, he has been permitted to carry mail unmolested, until now. Last month the people of Nantucket appeared before the legislative committee in Boston and sought the enactment of a law prohibiting the use of automobiles on the island at all times during the year. Prior thereto a special town meeting was held, at which of the 600 present but three voted against the measure. The result of the agitation against motor cars will be awaited with interest.

ADVERTISING WITH MOTOR CAR.

Poughkeepsie Dealer in Supplies Makes Known His Lines with Signs, Changing Them Daily.

Those utilizing motor vehicles can consistently develop advertising possibilities with them at comparatively small expense, for in regular service the machines are generally driven many miles daily, passing within the observation of many people. Motor vehicle owners realize what can be accomplished by carrying appropriate advertising signs on the cars.

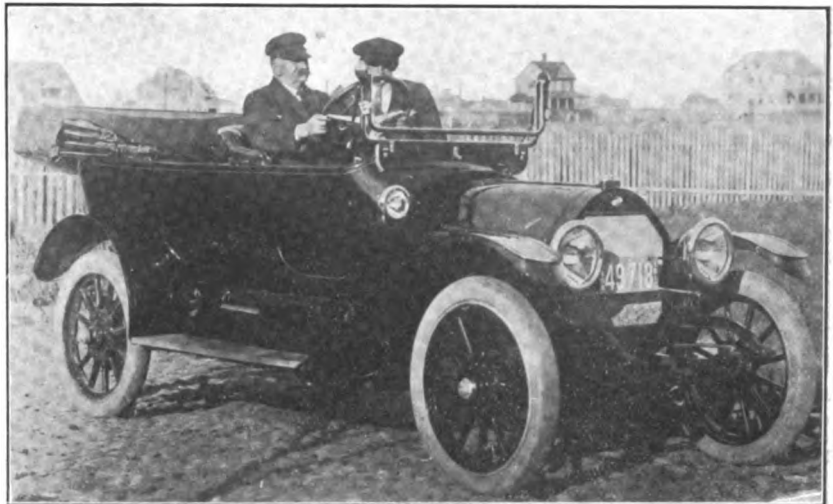
Signs are comparatively inexpensive and can be changed frequently. They can be made of sufficient proportions to be read at a distance and

can be used to material profit. An instance of advertising with a machine is the vehicle owned and used by John K. King of Poughkeepsie, N. Y., who is a dealer in motor vehicle supplies. He specializes in what he knows will interest owners and drivers of motor vehicles and has become known in a business way to all residents of the city in which he is located. This form of publicity is legitimate and has been very productive.

NATIONAL TOURING WEEK.

Reeves Suggests Plan to Stimulate Interest in Touring and to Hold Event in July.

Alfred Reeves, the new general manager of the National Automobile Chamber of Commerce,



Mail Carrier Clinton S. Folger and the Only Automobile on Nantucket—An Overland.

has proposed a plan for a national touring week the last part of June or early in July, when motor clubs and trade associations throughout the country could arrange local tours. The plan has met with general approval.

It is generally thought that the industry suffers through a lack of interest in touring and that its stimulation would be decidedly beneficial. It is contended that a motor touring week would do much to give a spirit of unity to the industry and also help business.

It is proposed that the National Automobile Chamber of Commerce give a medal to the winner in each trade association and that some awards be made to winners of club tours. Some form of simplified stock car registration will be necessary for this touring week where the dealers are concerned. There may be special rules for dealers' tours and others for clubs.



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BUSINESS IS GOOD.

Those who had opportunity to study the business situation as reflected by the retail sales at the recent Boston pleasure car show, were impressed by the very apparent desire on the part of those who had not as yet made selection of their 1914 model to be assured that they were not too late. Undoubtedly, this same feeling may in some measure account for the record breaking sales which have been consummated at practically all of the automobile shows held this year.

Very little has been heard of late concerning those students of financial conditions who were loud in the prediction a few months ago that the automobile industry had reached the high tide of its development. Prospective purchasers

who were counselled at that time to await the temptingly low prices at which cars would be offered as a result of the many failures which were about due, have had occasion to learn that the manufacturer already was offering more car value for the money than ever before, and that instead of receiverships for the many, even those receivers which had been appointed were soon to be replaced by reorganized companies better capable of serving the public.

As a matter of fact, while it is confidently expected that the total output of the American automobile industry this year will exceed that of any previous year, there is much reason for believing that a car shortage will exist before the season closes. Many concerns already have contracted for the disposal of practically their entire product. This means, of course, that it has been placed with dealers. There is nothing wrong with the automobile industry. Those who thought there was were simply mistaken.

CALIFORNIA AND MICHIGAN.

It is surprising to note the difference of opinion that may exist in the minds of those who are called upon to decide as to the constitutionality of motoring laws. It is hardly more than a month since the supreme court of California handed down a decision in which it held that even if the state were attempting to secure revenue under a law which was described as a licensing measure, the law would be valid. Now comes the supreme court of Michigan, which holds that the law in question in that state is invalid because it seeks to secure revenue while purporting to be a licensing measure.

The time must surely come when this matter must be decided by the United States supreme court. Either the motorists have constitutional rights which are being violated, or they have not, and it would appear that they should be in a position to know definitely. Mississippi, Ohio and Michigan have decided the proposition one way, and California another. There appears to be no opportunity for a definite determination of the point without appeal to the federal court. And when the matter is taken up to that tribunal, it ought to include every phase of the situation, so that the point may be determined once and for all.

QUALITIES OF DIESEL OIL ENGINES.

Possibilities for Adoption for Pleasure and Freight Vehicles, by Overcoming Difficulty of Starting and Increasing Its Flexibility---Value of Fuel Pressures.

*By Eric W. Walford.

IT IS held by many that the fuel problem would be largely solved if the Diesel engine could be produced in small sizes suitable for service

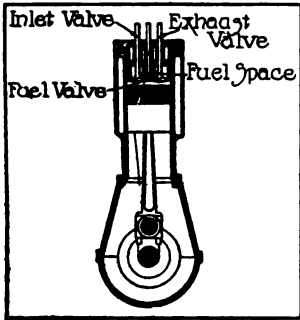


Fig. 1—Sectional Diagram of Diesel Engine.

with the motor vehicle, on account of the ability of this engine to utilize heavy grades of fuel. The advantages of the type are: The ability to use cheap and easily obtained fuels, economy of operation and the elimination of the carburetor and magneto. Some of the disadvantages of the Diesel engine are:

High cylinder pressures necessitating great strength and weight, lack of flexibility, difficulty in starting and accurate measurement of the fuel.

Before discussing the above features and the possibility of overcoming these disadvantages so as to render the Diesel engine practicable for motor car work, it may be well to describe the method of operation of the engine, with the aid of the drawing at Fig. 1, which is merely diagrammatic, but represents the chief essential features.

Operation of Diesel Engine.

It will be noted that the compression space is extremely small, and that, between the two main valves, the inlet and the exhaust, is arranged a fuel valve. Driven by the engine is a pump which supplies air to an air cylinder. The engine illustrated operates on the four-cycle principle, but the Diesel principle can be applied to two-stroke cycle engines also. It is assumed that the engine has exhausted gas through the exhaust valve in the ordinary way and that the piston is about to descend. The inlet valve in the cylinder head is then opened and air alone, usually at atmospheric pressure, is drawn into the cylinders. (Sometimes this air is at a pressure above that of the atmosphere.) On the upstroke of the piston this air is compressed until, at the top dead centre, the pressure is about 500

pounds to the square inch. (In the ordinary motor car gasoline engine the pressure rarely exceeds 75 pounds the square inch.)

At the top dead centre the central or fuel valve opens, admitting fuel and compressed air. Prior to this the space around the fuel valve has had supplied to it a small quantity of oil which forms the fuel. Directly the fuel valve opens, air, compressed to a pressure of more than 500 pounds a square inch, is admitted through the fuel space and the now open fuel valve, injecting the oil from the fuel space into the combustion chamber in the form of a spray.

Compression Temperature.

The air in the combustion chamber being at a pressure of about 500 pounds to the square inch, the consequent temperature is sufficient to produce ignition. The oil as it enters the combustion chamber therefore burns, and this combustion is maintained throughout a varying portion of the power stroke, say the first quarter, when the engine is running at full load. The supply of fuel and extra air is terminated by the closing of the fuel valve. The piston, therefore, descends under the pressure of the combustion above it, until towards the end of the stroke the exhaust valve opens as usual, and on the upstroke the products of combustion are exhausted. The same sequence is then repeated.

A small pump arranged at the side of the engine maintains the supply of compressed air necessary for injecting the fuel, and compressed air is also as a rule used for starting the engine, but the mechanism employed is omitted from the drawing to simplify it.

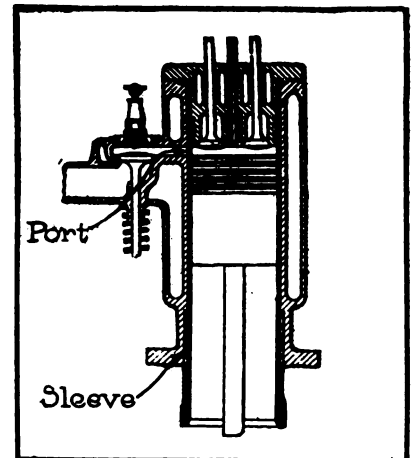


Fig. 2—Okill's Starting System for Diesel Engine.

*Extract from The Autocar.

From the high temperature of the air in the combustion chamber it is clear that almost any finely divided fuel will be ignited. In addition to petroleum oils, creosote and tar oils can be used, which can be obtained in practically any country, and it has been suggested that coal dust could be employed, and, theoretically, there is no doubt it could, but the practical difficulties are so great that experiments with this fuel have never proved a success. The fuels that can be utilized are all extremely cheap in themselves, and, furthermore, this engine does more work to a gallon of fuel than does the ordinary gasoline, kerosene or gas engine, so that the economy of running is still further increased. Carburetor and magneto troubles are non-existent, but in place of these there are the air pump and the air bottle. So much for the advantages of the engine, which are particularly potent where the en-

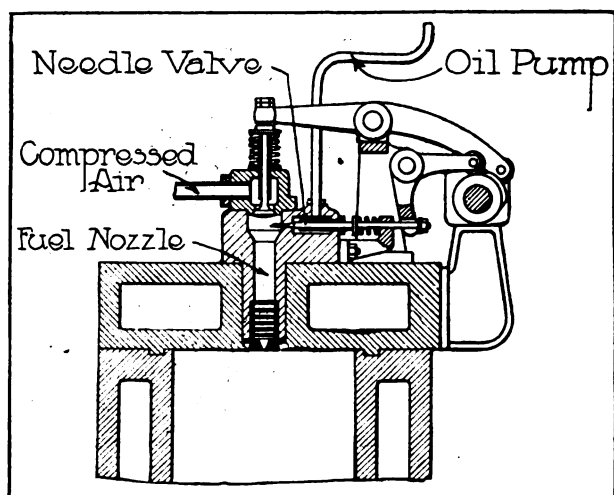


Fig. 3—Suggested Method of Fuel Feed for Diesel Engines Which Might Be Adapted to Automobiles.

gine is of large size and used for continuous running.

Limiting Factors.

It will be readily understood that the pressures in the cylinders are extremely high, with the result that the cylinders and all moving parts must be correspondingly strong. This means great weight, and the weight of the reciprocating parts assists in limiting the speed of the engine, although there are more important limiting factors. Similarly, the engine will not run very slowly, so that the range of speed is very small. This certainly applied to the first gasoline engines, but everybody will agree that the modern automobile engine will operate at a sufficiently wide variation of speed, so that there is hope that the same improvement may be effected in the Diesel engine. To raise a compression of 500

pounds to the square inch it is clear that hand starting is impossible, but manual starting has been replaced on the motor car by the electric and other forms. However, considerably more power would be required to start a Diesel engine than an ordinary motor of the same size.

Starting Method.

The more recently patented arrangement shown at Fig. 2 is interesting as suggesting one method of overcoming this difficulty. Here the engine operates on the ordinary Diesel principle, but when the sleeve between the piston and cylinder walls is lowered, a port in the left hand side of it is brought opposite the combustion chamber, putting this in communication with a valve pocket. By this means the combustion space is considerably enlarged, so that the compression normally used on gasoline engines can be obtained. This valve pocket contains a spark plug and an inlet valve from which gas can be drawn from an ordinary gasoline carburetor. With the sleeve in the operating position the engine can work on the ordinary Otto cycle, using gasoline vapor. Directly it is well started the sleeve can be raised so as to cut off the valve pocket, allowing the engine to operate on the Diesel principle.

Varying Speed.

Accurate measurement of the fuel supply is of very great importance, and the power is varied by varying the period during which injection of the fuel occurs. The quantity of fuel supplied at each stroke is small even with comparatively large stationary engines. With an engine of four-inch bore and five-inch stroke, assuming the fuel pump to be five mm diameter, a stroke of only 3.1 mm would be required when the engine is running under full load, and under light loads the stroke would be only about three-quarters of a millimeter. This shows that the ordinary fuel feeding system would have to be considerably modified.

It is not suggested that attempts have not been made to use Diesel engines for motor car work, as Dr. Diesel himself co-operated with Sulzer Bros., Zurich, in experimenting with a Diesel car, but without practical success. The work is now in the hands of the Delaunay-Belleville Company, in Paris, and before the late Dr. Diesel died he expressed great hopes for the future of his device in automobile development, and anticipated seeing a Diesel car in which all minor operations, such as gear changing, brake application, etc., were effected pneumatically.

Factor of Fuel Supply.

As the pressures inside the cylinder are so extremely high, much difficulty is experienced in

preventing leakage. This would be increasingly difficult in small engines in the hands of unskilled operators. The chief difficulty standing in the way of the adoption of the Diesel engine for motor car work is in measuring accurately the very small quantity of fuel required and varying the supply as the call for power varies. A variable delivery pump is an easy matter to design, but it is very difficult to make such a pump supply a minute quantity of liquid.

The application of the Diesel engine to motor cars is dealt with at some length in a German magazine, *Allgemeine Automobil Zeitung*, of December, 1912. One method of overcoming the difficulty described therein is shown in Fig. 3, which depicts part of a cylinder head with a central fuel nozzle, which is of the open type. Just prior to the compression stroke the needle valve opens and a small quantity of fuel, under gravity or slight pressure, is caused to enter the open nozzle, the quantity admitted being determined by the period of opening of the needle valve. The nozzle contains perforated discs which impose a tortuous path on the fuel so that it does not enter the cylinder during the compression stroke. At the end of the compression stroke the air valve opens and compressed air scavenges the nozzle, blowing the finely divided fuel into the combustion chamber. In this case a single and comparatively large fuel pump for a number of cylinders is used, and the amount supplied is controlled by varying the movement of the needle valve of each cylinder.

As Applicable to Motor Cars.

The difficulties standing in the way of the development of this engine for motor car work are therefore mostly practical ones, and when the extraordinary advance that has been made in the construction of ordinary automobile motors is considered, the future seems hopeful. By the use of chrome and vanadium steels it would seem possible to make the parts of the required strength with comparatively low weight, rendering the engine practicable for industrial cars at any rate. The pressures might be further lowered by heating the air so that the compression would not have to be so high to obtain the necessary ignition temperature. The lack of flexibility might be overcome by combining with the engine a simple form of electric transmission system, and the transmission system itself might provide an electric starter. Doubtless these features introduce practical difficulties of their own, but as the matter is in the hands of the Delaunay-Belleville Company, it is expected that in time a Diesel car will be on the road.

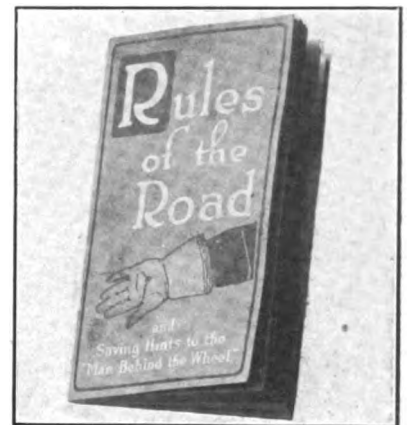
"SAFETY FIRST" BOOKLET.

B. F. Goodrich Company Issuing Data on Rules of the Road Which Will Be Mailed Free.

In line with their policy of supplying motorists service, the B. F. Goodrich Company, Akron, O., have issued a booklet, "Rules of the Road". The purpose is to further the "Safety First" movement by placing valuable hints in such concrete form that they can be quickly mastered by the motorist.

Both new and experienced operators will appreciate the information contained in the booklet as it gives in a clear, concise manner, many new regulations which are generally acquired by the new driver by experience. Rules governing street traffic, such as passing, turning, stopping and starting are included, also data on precedence on right of way, speed laws, respective rights and duties of operators and pedestrians, lights, etc.

Chapters are devoted to the care and repair of tires, how to secure the Goodrich touring service, road marking service, good roads and how to obtain the benefits of the Goodrich



"Rules of the Road", Booklet Issued by B. F. Goodrich Company.

service station. The booklet is replete with useful and practical information and dealers who wish to supply their customers can obtain free copies of the brochure by writing the company. The booklet will also be forwarded to motorists by writing the B. F. Goodrich Company, Akron, O. It is nicely printed.

OVERHAULING THE MOTOR CAR.

Attention is specially directed to the April 25 issue of *The Automobile Journal*, which will be the annual overhaul and equipment number. An effort will be made to present descriptions and illustrations of such equipment making for economy of time and labor. Manufacturers' data must be in the hands of the editor not later than April 18 to insure its publication.

WITH THE MOTORING INTERESTS ABROAD.

Swedish Winter Trials Marked by Use of Alcohol as Fuel---Interesting Successful Freak Car Made in Germany---Other Automobile News from Foreign Lands.

ADDITIONAL interest attaches to the winter trials held in Sweden recently from the fact that four of the cars taking part were equipped to burn alcohol as fuel. These were a Minerva, Scania-Vabis, Opel and Hupmobile. The two first named finished the journey from Stockholm to Gothenburg and return, a distance of 790 miles.

Shortly before the holding of the trials, N. P. Mathiasson, director of the Reymersholms spirit factory, who has been encouraging practical experimentation with this fuel for some time, presented a trophy to be awarded to the car making the best showing on alcohol. The trophy appears to have been won by the Scania-Vabis, a car which is the product of a Swedish manufacturer.

erva-Knight, this being the third trial in which this combination has secured the trophy. The Gothenburg cup went to an N. A. G., this being the chief award for small cars. The best time in the hill climbing test was made by a Cadillac.

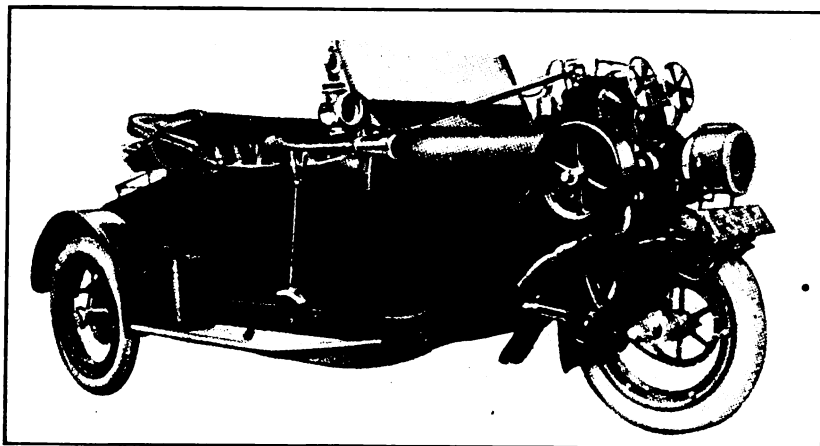
DETAILS OF THE PHANOMOBILE.

Interesting Machine Described by a British Owner as a Successful Freak Car.

An accompanying illustration presents the Phanomobile, a three-wheel motor vehicle, made in Germany, which is described by its British owner as a successful freak car. It is stated that machines of this type have been produced in Germany for eight or nine years, although, of course, they have differed in the detailed construction.

This model is fitted with a four-cylinder, air-cooled engine, the four cylinders of which are cast singly. This motor has a bore of 74 and stroke of 90 mm (2.9 by 3.5 inches), and is rated at 12 horsepower. It is mounted above the pivoted front wheel, at right angles to the direction of motion. The carburetor and fuel inlet are behind the cylinders, where they are held to be protected and to be in such position as to facilitate vaporization. The exhaust is in front. Ignition is by Bosch magneto and cooling is by the two fans shown.

This motor drives to the front wheel, by means of a two-speed transmission and two short chains. The gear ratios are 4:1 and 11:1. The high speed is said to give 40 miles an hour and the low speed 15. Steering is by tiller. Two sets of brakes are fitted and this owner declares that the springing is all that could be desired in any car. Indeed, he says he intended to fit a set of J. M. shock absorbers when he bought it, but has decided that this would prove entirely unnecessary. He adds that he has thus far secured 4800 miles from the driving tire and about 30 miles to the gallon of fuel on very hilly roads.



Phanomobile, Described by Its British Owner as a Successful Freak Car.

According to the Stockholm Dagblad, the Minerva car behaved well throughout, with the exception that the carburetor had to be cleaned on two occasions, and the stops thus necessitated spoilt an otherwise clean score. With the exception mentioned, the engine worked excellently and appeared to do practically well on the hills, where it was among the best performers. The Hupmobile was fitted with a supplementary tank containing gasoline, which was used for starting and until the motor had developed some initial heat before turning over to alcohol. No statement is made as to the reason for its failure to finish.

The Winter cup, premier award in the large car class, went to Hans Osterman in a Min-

CAR LIGHTING COMPETITION.

Eisemann Design Takes Second Prize in Electric Division of Belgian Tests.

A car lighting competition was conducted recently by the Association Automobile de Belgique in Belgium, the makes of lighting equipment being divided into classes: First for electric, second for acetylene and the third for other systems. There were seven entries in the first class, six in the second and two in the third.

The awards were made on a basis of 300 points, this maximum being distributed as follows: Power of the headlights, ascertained by testing their ability to illuminate, so as to make them reasonably legible at night, from a given point, different sized figures on a notice 164 yards distant, 100 points; regularity of operation and facility for repairs and recharging, 50; ease of installation and general simplicity, 50; facility of upkeep and accessibility, 25; elegance of design, ease of cleaning and minimum space occupied, 25; low price, 25. The sets to be tested were required to include two headlights, two side lights, a tail light and a dash lamp.

Awards were made as follows: Electric—Willocq-Bottin, 271 points; Eisemann, 254; Magicienne, 233; C. A. V., 211; Rubis, 210. Acetylene—Lucidus, 221 points; Willocq-Bottin, 211; Polaire, 209. Other systems—B. R. C., dissolved acetylene, 254; Willocq-Bottin, oxy-gasoline, number of points not stated.

EMPIRE IN MEXICO.

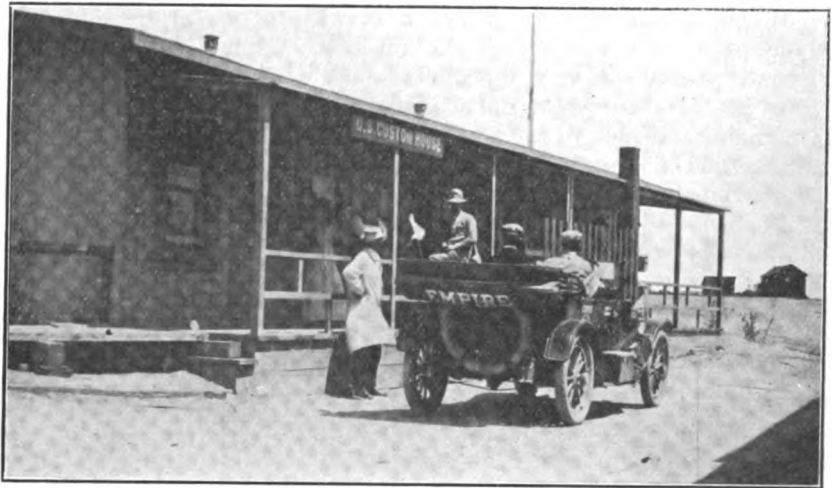
Experiences of American Automobile Men on Recent Trip to Troubled Country.

An accompanying illustration shows an Empire car, made by the Empire Automobile Company, Indianapolis, Ind., about to enter Mexico at Tia Juana, in charge of Harlow Hyde, advertising manager for the company, and William H. Nolan, a resident of San Diego, Cal. The trip into Mexican territory was made as a continuation of a transcontinental tour, and the experiences of the party, although mild to an extreme when compared with those of other Americans who have visited that troubled country recently,

were such as to rob the event of much of its pleasure.

Upon reaching the boundary the party was informed that it must leave all fire arms behind. This injunction having been complied with, application was made for permission to take a few snap shots of points of interest. This permission was granted, accompanied by an injunction not to take pictures of the federal fort.

Mr. Hyde acted as camera man, and, after taking pictures of a few inoffensive objects, he climbed back into the car with the camera open. The car was approaching the fort, when one of the members of the party recalled that it was a criminal offense to expose a camera within 100



Empire Car and Party of Americans About to Cross the Border into Tia Juana, Mexico.

yards of the fort. Less than 40 feet separated the machine from the fort when this situation was realized. The immediate presence of soldiers spurred the man at the wheel to give the Empire one of its most strenuous speed tests in reaching the American side of the border.

FRENCH IMPORTS AND EXPORTS.

Report for 1913 Shows United States Sales Were Nearly Twice Its Purchases.

Interesting figures are revealed by the annual report of exports and imports made public by the French government for the year 1913. The exports to the United States fell off very materially, and this was true to some extent with respect to Great Britain and Germany, but those to all other countries were increased.

The value of exports for the year were: To Great Britain, \$10,671,768; Belgium, \$7,396,402; Algeria, \$4,403,102; Germany, \$3,978,888; Argen-

tina, \$3,323,653; Brazil, \$1,229,679; Spain, \$1,316,839; Russia, \$1,263,764; Italy, \$1,125,769; Switzerland, \$920,801; United States, \$614,319; all other countries, \$7,148,797; total, \$43,893,797.

The imports into France, excluding those to Morocco, Algeria and other protectorates and possessions, amounted to \$3,860,000. Great Britain sent \$1,220,655 worth of cars; America, \$1,096,859; Germany, \$529,241; Belgium, \$441,970, and Italy, \$323,854.

BERLIN SHOW PLANS.

German Manufacturers Planning for Race Meet During Week of the Display.

It would appear that every effort was to be made to attract and retain the interest of the German people during the progress of the Berlin show in October. Not only have the automobile manufacturers of that country arranged to erect a special building for the display, but it is now planned to hold a race meet during the same week.

Thus far the plans are in a tentative state, merely, but it is suggested that a special track be built along the railway leading to Potsdam. The two straightaways are to be about six miles in length. At one end the track is to pass under the railway, and at the other, over it, with a side sweeping curve at each end. Thus the entire circuit would be a trifle over 12 miles.

GASOLINE IN BULK.

Great Britain's Change of Plans Makes Business Good in Kindred Lines.

As was stated in these columns recently, the motorists of Great Britain have been considering the purchase of gasoline in bulk, instead of in tins as in the past. British motoring prints have been advising their readers to give the new plan a thorough trial, as it is believed that the cost of fuel can be reduced very materially in this manner. One of the results has been that dealers in storage systems, largely of American manufacture, have been doing a splendid business during the past few weeks.

Now that most dealers in petrol or motor spirit, either of which terms is taken to mean gasoline, have been supplied with storage tanks and many motorists have followed their example, the large fuel companies are laying plans to meet the demand for their product. The British Petroleum Company, Ltd., is said to have placed or-

ders for some 120 or 130 motor trucks with tank wagon bodies for making deliveries in all sections of the United Kingdom, a few of which already have been delivered. The Bowring Petroleum Company also has purchased a large number of such wagons.

Those supplied to the former company are of the Halley and Albion makes, each with 1000-gallon tanks mounted on four-ton chassis, the tanks being divided into three compartments for different grades of fuel, oil, etc. The Bowring company is using Dennis five-ton chassis, with tanks of a similar construction.

NEWS NOTES FROM ABROAD.

It is understood that new crude petroleum fields have been discovered in South Africa, which are expected to yield large quantities of crude oil. The find is located in a district where oil shale has been mined, yielding 85 gallons of crude oil to the ton. It is stated that the product is within easy access to eastern ports, and British motorists are exceedingly hopeful that the discovery will have an important bearing upon the price of gasoline in the near future.

The maker of the Mercedes car announces that it will shortly place in the market a new 28-95 horsepower sporting chassis, equipped with the six-cylinder aeroplane engine, which recently created a world's non-stop flying record of 16:20:00. This motor has a bore of 165 mm and stroke of 140 mm (4.13 by 5.5 inches).

The Royal Automobile Club of Hungary will hold an international competition for touring cars, to be known as the circuit des Carpathes, May 24-31. The machines will start from and finish at Budapest.

The Ford Motor Company has secured a verdict against an agent in London, which establishes its right to fix a minimum price at which its cars may be sold in that country.

The Car, a British motoring print, declares that there are at present 245,907 automobiles registered in the United Kingdom, of which 18,000 are commercial vehicles.

TRENTON HONORS PULLEN.

Winner of Grand Prize, and Mechanician, Given Watches and Banqueted by Citizens.

Eddie Pullen, who drove the Mercer car to victory in the Grand Prize race at Santa Monica, Cal., was given a banquet by the citizens of Trenton, N. J., in honor of his winning the big event and being the first American driver to successfully pilot an American made car in it. Pullen and his mechanician, Andrew Vollman, were both given solid gold watches of Trenton make, also fobs containing a duplicate of the seal of the city, and enamelled in the city colors. An immense parade, headed by Pullen in the winning Mercer, was one of the features of the celebration. Prizes were awarded for the best decorated automobiles and motorcycles. At the conclusion of the banquet the Grand Prize Cup was presented to the Mercer Automobile Company by an official of the Automobile Club of America.

CARS CARRY EXPLOSIVES.

American Glycerin Company Uses Fleet of Specially Constructed Motor Vehicles.

The oil fields of Oklahoma include a large area of country that has been little developed. When wells have been drilled they are generally in localities sparsely inhabited, which necessitates carrying material and supplies sometimes long distances, frequently over country that has hardly a trail, and haulage is not only difficult, but considerable time is required.

After wells have been drilled it is occasionally necessary to explode nitroglycerine in them with a view of starting the flow of oil, and for this reason considerable quantities of this high explosive are carried about to the different places where the work is in progress. To do this work with horses is costly and dangerous, and for this reason the companies that manufacture and distribute nitroglycerine have found it advisable to use vehicles that would be more thoroughly under the control of the driver, as well as having long mileage. That is, they have taken kindly to motor vehicles, which have been specially equipped so that the explosives may be carried without danger.

The American Glycerin Company, with headquarters at Battersville, Okla., has now in use five Adams 3000-pound wagons, which have been built expressly for this work. The machines have 42-inch wheels, which gives good clearance on the rough roads and cross country hauls, and the chains are enclosed to prevent wear and to avert danger. The bodies are of the express type, but are fitted with special boxes that have covers that may be locked, and are divided into compartments, each of which will carry a single can. The capacity of each wagon is 720 quarts. With loads that have sufficient explosive energy to devastate a large area of territory, these machines are driven hundreds of miles each month, covering rough country, in all kinds of weather, and giving the best of satisfaction.

ARMORED TRUCK IN WAR.

Mexican Constitutionalists Under General Villa Utilize Two-Ton Steel Clad Machine.

The Mexican constitutionalists, of whom General Villa is regarded as the chief, are now using a two-ton Mack chassis, which has been fitted with steel armor and adapted for use on rails or ordinary roads. The wheels are armored

so that they cannot be damaged by rifle fire, and the body is constructed of sheet steel with an entrance at the rear, this resembling a conventional building because of the straight walls and slanting roof, while the hood and radiator are protected by a dome that drops nearly to the axle and carries the lamps.

The chains are shielded by aprons mounted on the sides of the body. The wheels are so built that in comparatively little time they can be changed for either road or rail propulsion. The machine is equipped with machine guns and these and the arms and ammunition are carried within the body.

AS AFFECTING RAILROADS.

Boston Car Accountant to Deliver Lecture Before Electric Vehicle Association of America.

Fred A. Hortter of Boston, car accountant of the Boston & Maine railroad system, who has given his subject careful study and can speak with experience and knowledge from the viewpoint of the railroad corporation, will deliver a paper on "The Effect of Power Wagon Operation on Terminal Freight Congestion" before the Electric Vehicle Association of America at the headquarters at 29 West 39th street, New York City, on the evening of April 24.

Mr. Hortter's observation covers a long period of time and the paper will be of much practical value, for it will deal with the aspect of the railroads and will present conditions as generally realized by transportation companies. From this point of view the estimate of the influence of the use of power wagons will be extremely interesting, and will undoubtedly be valuable for all persons shipping or receiving freight, for the possibilities for relief of congestion at terminals will mean a great deal to every business man. The subject will be approached from an operating viewpoint and with a purpose of suggesting relief from existing conditions, rather than advocating the use of any particular type or form of vehicle. Officials of the various railroads and steamship lines have been invited to be present, as well as representatives of different civic bodies.

The purchaser of a new machine who intends to attend personally to its upkeep, will find many valuable suggestions dealing with the selection of the garage equipment in the annual overhaul and equipment number of The Automobile Journal of April 25.

CORRESPONDENCE WITH THE READER.

Adjusting Overland Oiler—New Reader, Boston.

I purchased a second hand Overland model 69 recently and, while I am fairly familiar with the motor, do not understand the method of cleaning and adjusting the oiler. I was told how to increase or decrease the amount fed to the cylinders, but would appreciate an explanation of the workings of the oiler.

The oiler employed on the model 69 Overland is mechanical, and at Fig. 1 is shown a sectional view of it with the components lettered. It will be noted that it consists of a yoke shaped member, the horizontal section of which rests on a cam. The last named member is actuated by the camshaft. This cam is so mounted that when it rotates it lifts the yoke, to which is pivotally attached a plunger. A spring returns the plunger to its seating. In the illustration the yoke is shown raised.

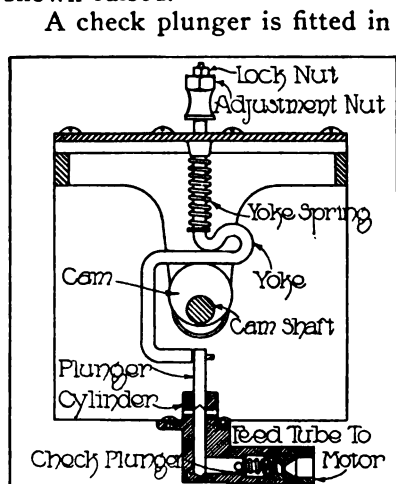


Fig. 1—The Model 69 Overland Lubricator.

A check plunger is fitted in the feed tube, its function being to control the lubricant which is forced past it by the descent of the plunger. The amount or quantity of oil forced past the check plunger depends upon the stroke or displacement of the plunger proper. If the plunger is moved downward, by screwing down the adjustment nut the stroke is decreased, as is the supply of lubricant. Raising the plunger increases the supply.

This type of oiler is very satisfactory and will not give trouble if clean oil is used. Foreign elements have a tendency to clog the feed tube and should this occur it will be known easily by the plunger remaining up. The plunger moves up slowly, and drops suddenly, as will be noted by watching it when the motor is operating.

Horsepower Rating—N. A. Nelson, Missionhill, S. D.

Please explain in your columns at your earliest convenience, what the S. A. E. and A. L. A. M. ratings are and wherein they differ. If the methods of calculation are not too intricate would like to have you explain them both quite fully.

The S. A. E. and A. L. A. M. ratings are the same and the horsepower is based upon the bore,

the stroke not being considered. To figure the horsepower, square the bore, multiply the result by the number of cylinders and divide by 2.5.

For example: A four-cylinder motor having a bore of five inches and stroke of seven would be figured as follows:

$$5 \times 5 = 25 \times 4 = 100 \div 2.5 = 40.$$

The figure 25 represents the square of the bore, which is multiplied by the number of cylinders, which in this instance is four, and the product 100, divided by 2.5 is 40, the horsepower. The S. A. E. rating is based on an assumed piston speed of 1000 feet a minute. The subject of S. A. E. and manufacturers' ratings was explained in the March 25 issue.

Areas of Circles—Repairman, New Britain, Conn.

Some time ago you published a table giving the circumferences and areas of circles. Will you kindly forward a copy of the book to the address enclosed?

The files for the date mentioned are exhausted, but the data referred to are reproduced in the table at Fig. 2.

Naphtha—Information, Bangor, Me.

What is naphtha? Are naphtha and gasoline the same? Which wheel lifts from the ground in turning a corner at high speed and what is the cause? What is the mean effective pressures of motors?

The term naphtha covers a wide range of the distillates of petroleum. It is usually refined to a point of slightly lower specific gravity than gasoline.

The inside wheels of a machine have a tendency to lift when rounding a curve at speed. If the machine does not skid, which is due to centrifugal force, produced by a change in the direction of motion, the tendency is for the car to turn over outwardly.

The mean effective pressure in standard vehicle motors is about 71 pounds the square inch. This pressure has increased since the beginning of the automobile industry, but in a lesser proportion than the speed. It varies with the size of the motor. Thus, in a current type of motor having cylinders with a 2.4-inch bore and stroke of 4.8 inches, it attains about 57 pounds the square inch. In a motor having a bore of 3.2 inches and stroke of 5.2 inches, it is about 71 pounds the square inch, and in a motor having a bore of 4.4 inches and stroke of 5.6 inches it is about 85 pounds, all other conditions being equal. This is at 1000 revolutions a minute. The mean effective pressure increases as the result of

increased compression. It decreases as the number of revolutions a minute increases.

Tire Troubles—New Owner, Indianapolis, Ind.

Being a new owner and a subscriber to your book, I am naturally interested in anything that is going to help me in the upkeep of my machine. I hear a lot about care of tires and would like to know what are the principal causes of their deterioration.

According to figures compiled by a prominent tire maker, the result of investigations in several thousand repair jobs, the greatest causes of trouble are insufficient inflation and perforations; that is, leaving out the factor of normal wear and tear, which is estimated at 37.1 per cent. It is figured that 29.4 per cent. of trouble

pressure every few days with a gauge, which is inexpensive and much cheaper than a new casing. In fitting a new shoe and when inflated to the normal standard, it should be borne in mind that it will stretch and that it will be necessary to test the pressure and maintain it to that recommended by the maker until it has become what is known as "set".

Go over each tire daily and if any cuts exist have them vulcanized or repaired. Portable types of vulcanizers are not only practical and moderately priced, but are easily operated. There are several preparations for mending cuts and these may be obtained from any supply house. In-

CIRCUMFERENCES AND AREAS OF CIRCLES

Diam. Inch	Circum. Inch	Area. Sq. In.	Diam. Inch	Circum. Inch	Area. Sq. In.	Diam. Inch	Circum. Inch	Area. Sq. In.	Diam. Inch	Circum. Inch	Area. Sq. In.
1/64	.04909	.00010	1 11/16	5.3014	2.2365	4 7/16	13.941	18.941	8 1/4	25.918	53.456
1/32	.09818	.00077	3/4	5.4978	2.4053	1/2	14.137	19.904	3/8	26.311	56.088
3/64	.14726	.00173	13/16	5.6941	2.5802	9/16	14.334	20.349	1/2	26.704	56.745
1/16	.19635	.00307	7/8	5.8905	2.7612	5/8	14.530	20.800	5/8	27.090	58.426
3/32	.29452	.00690	15/16	6.0868	2.9463	11/16	14.726	21.257	3/4	27.489	60.132
1/8	.39270	.01227	2	6.2832	3.1416	3/4	14.923	21.728	7/8	27.882	61.882
5/32	.49087	.01917	1 1/8	6.4795	3.3410	13/16	15.119	22.190	9	28.274	63.617
3/16	.58905	.02761	1 1/8	6.6759	3.5466	7/8	15.315	22.665	1 1/8	28.667	65.397
7/32	.68722	.03758	3/16	6.8722	3.7583	15/16	15.512	23.147	1 1/4	29.060	67.201
1/4	.78540	.04909	1/4	7.0686	3.9761	5	15.708	19.635	3/8	29.452	69.029
9/32	.88357	.06213	5/16	7.2649	4.2000	1 1/8	15.904	20.129	1/2	29.845	70.882
5/16	.98175	.07670	3/8	7.4613	4.4301	1 1/8	16.101	20.629	5/8	30.238	72.760
11/32	1.0799	.09281	7/16	7.6576	4.6664	3/16	16.297	21.135	3/4	30.631	74.662
3/8	1.1781	.11045	1/2	7.8540	4.9087	1/4	16.493	21.648	7/8	31.023	76.589
13/32	1.2763	.12862	9/16	8.0503	5.1572	5/16	16.689	22.166	10	31.416	78.540
7/16	1.3744	.15033	5/8	8.2467	5.4119	3/8	16.886	22.691	1 1/8	31.809	80.516
15/32	1.4726	.17257	11/16	8.4430	5.6727	7/16	17.082	23.221	1 1/4	32.201	82.516
1/2	1.5708	.19635	3/4	8.6394	5.9396	1/2	17.279	23.758	3/8	32.594	84.541
17/32	1.6690	.22166	13/16	8.8357	6.2126	9/16	17.475	24.301	1/2	32.987	86.590
9/16	1.7671	.24850	7/8	9.0321	6.4918	5/8	17.671	24.850	5/8	33.379	88.664
10/32	1.8653	.27688	15/16	9.2284	6.7771	11/16	17.868	25.406	3/4	33.772	90.763
5/8	1.9635	.30680	3	9.4248	7.0688	3/4	18.064	25.967	7/8	34.165	92.886
21/32	2.0617	.33824	1 1/8	9.6211	7.3662	13/16	18.261	26.535	11	34.558	95.033
11/16	2.1598	.37122	1 1/8	9.8175	7.6699	7/8	18.457	27.109	1 1/8	34.950	97.205
23/32	2.2580	.40574	3/16	10.014	7.9798	15/16	18.653	27.688	1 1/4	35.343	99.402
3/4	2.3562	.44179	1/4	10.210	8.2958	5	18.850	28.274	3/8	35.736	101.62
25/32	2.4544	.47937	5/16	10.407	8.6179	1 1/8	19.242	29.465	1/2	36.128	103.87
13/16	2.5525	.51849	3/8	10.603	8.9462	1/4	19.635	30.680	5/8	36.521	106.14
27/32	2.6507	.55914	7/16	10.799	9.2806	3/8	20.028	31.919	3/4	36.914	108.43
7/8	2.7489	.60132	1/2	10.996	9.6211	1/2	20.420	33.183	7/8	37.306	110.75
29/32	2.8471	.64504	9/16	11.192	9.9678	5/8	20.813	34.472	12	37.699	113.10
15/16	2.9452	.69029	5/8	11.388	10.321	3/4	21.206	35.785	1 1/8	38.092	115.47
31/32	3.0434	.73708	11/16	11.585	10.680	7/8	21.598	37.122	1 1/4	38.485	117.86
1	3.1416	.78540	1 1/16	11.781	11.045	7	21.991	38.485	3/8	38.877	120.28
1 1/16	3.3379	.8666	13/16	11.977	11.416	1 1/8	22.384	39.871	1 1/2	39.270	122.72
1 1/8	3.5343	.9640	7/8	12.174	11.793	1 1/4	22.776	41.262	5/8	39.663	125.19
3/16	3.7306	1.1075	15/16	12.370	12.177	3/4	23.169	42.718	3/4	40.056	127.68
1/4	3.9270	1.2272	4	12.566	12.566	1/2	23.562	44.179	7/8	40.448	130.19
5/16	4.1233	1.3530	1 1/16	12.763	12.962	5/8	23.955	45.664	13	40.841	132.73
3/8	4.3197	1.4849	1/8	12.959	13.364	3/4	24.347	47.173	1 1/8	41.233	135.30
7/16	4.5160	1.6230	3/16	13.155	13.772	7/8	24.740	48.707	1 1/4	41.626	137.89
1/2	4.7124	1.7671	1/4	13.352	14.186	8	25.133	50.265	3/8	42.019	140.50
9/16	4.9087	1.9175	5/16	13.548	14.607	1 1/8	25.525	51.849	1/2	42.412	143.14
5/8	5.1051	2.0739	3/8	13.744	15.033						

Fig. 2—Circumferences and Areas of Circles Up to and Including Diameters of 13 Inches.

is primarily due to perforations by nails, stones and pieces of iron. As a result water penetrates to the fabric, which deteriorates rapidly.

It is figured that 17.3 per cent. of tire troubles is due to insufficient inflation. A shoe should be inflated to the pressure recommended by the maker, and the pressure varies according to the size of the casing. When a tire is run improperly inflated the fabric is more susceptible to shocks and stresses, and in time the plies of fabric separate, paving the way for the inevitable blow-out.

Some owners inflate their shoes to the proper pressure when replacing a shoe, but fail to maintain the pressure. It is a good plan to test the

structions on the care and maintenance of tires and inner tubes may be secured from the branches of the various tire makers.

Spring Lubrication—Reader, Kansas City, Mo.

Is there any advantage in lubricating the leaves of a spring and what is the best lubricant and how should it be used?

All components of a chassis subject to friction should be lubricated. Much of the hard riding qualities of a machine that has been in service for some time are due to rust and foreign elements on the bearing surfaces of the springs.

While it is possible to use a spring spreader,

several types of which are marketed, for opening the springs sufficiently to permit of inserting a lubricant, the better method is to disassemble the spring. This will require a rugged clamp or a vise. The spring is displaced from the machine, placed in the vise and the jaws of the latter set up near the centre bolt. The latter is then removed and the vise opened gradually. The bearing surfaces of the leaves should be thoroughly cleaned and, if the surfaces are rough, smoothed with emery paper.

Next prepare a mixture of powdered graphite and oil. Use enough of the latter to make a thick paste and spread it over the bearing surfaces, then remove the surplus material with a cloth. Sprinkle a little of the dry graphite over the bearing surfaces and reassemble the leaves. The graphite will not only reduce friction to a minimum, but it will resist the action of water. It is surprising what a difference will be noted in the riding of the car after springs have been treated in this manner.

Millimeters Conversion—A. W. S., Danbury, Conn.

In automobile news I see very frequently the bore and stroke of cylinders given in millimeters. How is a millimeter converted into our measurement of inches?

The equivalent of a millimeter in inches is .03937. To obtain the bore and stroke of a motor when dimensions are given in millimeters, it is a simple matter to multiply the given millimeters by .03937.

Carburetor Floods—Information, South Bend, Ind.

I have a Schebler carburetor, model L, and am troubled with its flooding. What is the cause and how can it be remedied?

Two general causes of a carburetor flooding are dirt in the needle valve and a leaky float. The first named member is actuated by the float and controls the flow of fuel to the float chamber. When dirt or foreign elements are in the fuel, the valve will not seat properly, and fuel continues to flow into the float chamber, flooding it.

The float utilized on the Schebler is cork, and it is possible that the gasoline penetrates the pores of the material, causing the float to become impregnated with the liquid, thereby adding to the weight of the float. The last named is coated with shellac. If the float is suspected of being too heavy, remove it from the carburetor and dry it thoroughly, then give it a coat or two of good shellac. It is a good plan to test the action of a float to note its position in the float chamber, changing it if necessary.

S. A. E. COMMITTEES.

Meetings of the Groups Include Discussion on the Electrical Equipment of the Motor Car.

The following division chairmen have been appointed by the chairman of the standards committee of the Society of Automobile Engineers, Henry Souther, and these executives will arrange the meetings of the groups during the coming year: Aluminum and copper alloys division, William H. Barr, Lumen Bearing Company; ball and roller bearing division, Howard Marmon, Nordyke & Marmon Company; broaches division, C. W. Spicer, Spicer Manufacturing Company; carburetor fitting division, G. G. Behn, Hudson Motor Car Company; commercial car wheels division, William P. Kennedy, consulting engineer; data sheet division, B. D. Gray, Hess-Bright Manufacturing Company; electrical equipment division, A. L. Riker, Locomobile Company of America; electric vehicle division, J. R. Coleman, Atterbury Motor Car Company; frame division, J. G. Perrin, Lozier Motor Company; iron and steel division, Henry Souther; lock washer division, J. E. Wilson, National Lock Washer Company; miscellaneous division, J. G. Utz, Perfection Spring Company; motor testing division, J. O. Heinze, Northway Motor & Manufacturing Company; nomenclature division, Arthur B. Cumner, consulting engineer; pleasure car wheels division, Henry Souther, consulting engineer; research division, David L. Gallup, Worcester Polytechnic Institute; seamless steel tubes division, H. W. Alden, Timken-Detroit Axle Company; springs division, Harold L. Pope, Pope Manufacturing Company; truck standards division, William P. Kennedy, consulting engineer.

The standards committee will meet April 7-9; research division, April 21; electrical equipment division, May 5; ball and roller bearing division, May 12; motor testing division, May 14.

OVERHAULING THE MOTOR CAR.

Attention is specially directed to the April 25 issue of The Automobile Journal, which will be the annual overhaul and equipment number. An effort will be made to present descriptions and illustrations of such equipment making for economy of time and labor. Manufacturers' data must be in the hands of the editor not later than April 18 to insure its publication. Lighting and motor starting systems for small cars will be featured.

MERCER TEAM PICKED.

Pullen, Bragg and Wishart Will Represent Trenton Company at Indianapolis, May 30.

As anticipated, the Mercer Automobile Company of Trenton, N. J., has entered three cars in the annual 500-mile International Sweepstakes, to be held at Indianapolis, May 30. That Pullen and Wishart would pilot was known, but the selection of the third driver was not announced until recently, when it was stated that Caleb Bragg would complete the trio.

Bragg, who has been in Europe during the past few months, cabled that he was willing to drive one of the Mercer cars, and his services were accepted.

Pullen proved his ability by winning the Grand Prize race at Santa Monica, Cal., Feb. 28, at an average speed of 77.2 miles an hour. Wishart has been seen at the wheel of a Mercer for the past two seasons, and has achieved some signal victories, the most notable of which was his finishing second in the 1913 Indianapolis event in a 300 cubic inch Mercer. Bragg drove a Mercer in the last 500-mile event, but is best known as a pilot of high powered foreign cars. He won the Grand Prize race in 1912 in a Fiat.

AMERICAN CARS POPULAR.

Increase of Sales in Canada Reported by Representative of an American Manufacturer.

American made cars are finding favor with Canadians, according to Fred J. Titus, the former bicycle champion, who returned from a visit to Canada recently. He states that sales are increasing despite the fact that the duty on American machines is 13 per cent. more than on those imported from Europe.

Last year 7212 American cars, representing a value of \$9,233,561, were sold in Canada, as compared with 385 machines valued at \$700,504 disposed of in 1908. Statistics for 1913 indicate an increase of 934 cars over the figures of 1912.

MECHANICAL GEAR SHIFTER.

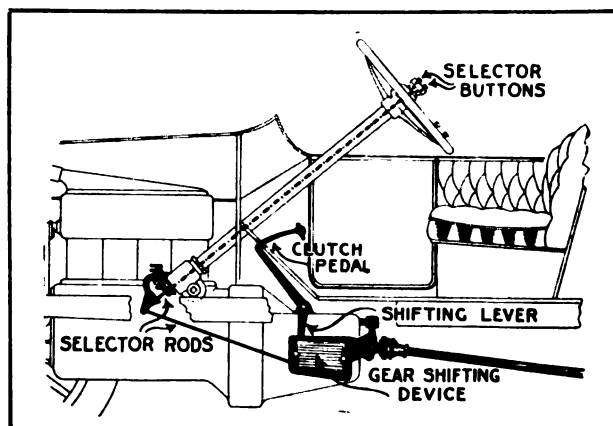
Vanderveld System Is Actuated by Selector Button on the Steering Wheel.

The Grand Rapids Show Case Company, Grand Rapids, Mich., is manufacturing a mechanical gear shifting device for motor cars, and

it is stated that it is adaptable to used machines as well as to cars in the process of manufacture. It is operated by the clutch pedal and selector buttons on the steering column or wheel. The device is the invention of A. Vanderveld. It weighs about 10 pounds, and is mounted in proximity to the transmission, as will be noted by the accompanying illustration.

The gear shifter proper is mechanical, no springs being utilized. It is connected to the clutch pedal by a lever or arm which has mounted on it two blocks adapted to engage with the gear shifting fingers of the gearset, there being one for each speed, connected directly to rods leading to the push buttons of the selector on the wheel.

Pressing a button raises the finger so selected in the path of travel of the shifting blocks, and the forward movement of the clutch pedal through the blocks contracting with the finger,



Vanderveld Mechanical Gear Shift, Operated by Clutch Pedal and Selector.

pulls the gear into mesh. If a gear be in mesh, and the clutch pedal be pushed forward or depressed, the blocks referred to first contact with a neutralizing member which releases the gear in mesh. Further movement of the clutch pedal places the gear in neutral, and by a still further movement of the pedal blocks contact with that finger selected and the gear is pulled into mesh.

It is pointed out that the pressing of a button does not actually shift a gear, this being accomplished by the forward movement of the clutch pedal. It is also stated that any change of speed may be anticipated by pressing the proper button, and by the next complete forward movement of the clutch pedal the desired speed is obtained. The maker states that the device is positive in action, permits of shifting gears without danger of stripping, etc., and may be attached to used cars.

NOVEL GRAVITY VACUUM FUEL SYSTEM.

FUEL is supplied to the carburetor by two general systems, gravity and pressure. The gravity method requires replacing the main supply at a pre-

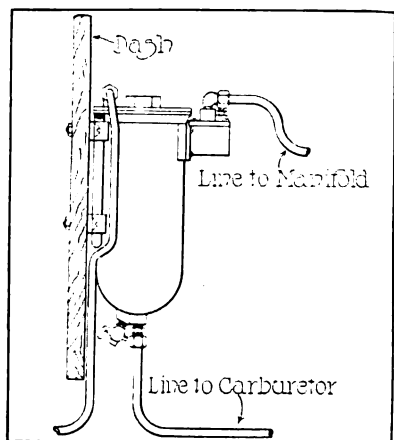


Fig. 1—Stewart-Warner Gravity Vacuum Fuel System for Which Many Advantages Are Claimed.

times in a position not easily accessible for adjustment, inspection, etc.

The pressure system generally comprises an air-tight tank, from which the fuel is forced by pressure to the carburetor, a power pump actuated by the energy of the motor, gauge, hand pump, etc. The system is favored by many manufacturers, as it permits placing the carburetor in proximity to the water jackets of the cylinders, the heat of which tends to raise the temperature of the fuel. Another advantage is that a much shorter intake manifold may be employed, which is held to make starting easier in that condensation of the mixture is prevented. With the pressure system, which may be one employing the energy of the exhaust gases, it is essential that all connections be air tight if efficient service is to be obtained.

Factors Eliminated.

The Stewart-Warner Speedometer Corporation, Chicago, has brought out what is termed a gravity vacuum system, which is held to eliminate pumps, air tight tanks, regulators, filters, etc., and to provide a gravity feed of fuel to the carburetor at a uniform pressure at all times and under all conditions of service. One of the qualities of the system is that the body may be suspended in the maximum low position without affecting the steady flow of the fuel. The Stewart-Warner equipment consists of a small tank placed on the dash under the hood or bracketed to base of motor, and a main supply member.

supply at a predetermined or sufficient height above the carburetor to insure a flow of the fuel when the machine is ascending a steep grade. This system frequently necessitates placing the carburetor below the base of the cylinders, and some-

One lead from the Stewart-Warner device connects with the main supply at the rear of the chassis, and it is stated that it is not necessary to employ an air tight construction or to use a leak proof filler cap, as an open vent is employed. One of the features of the system is that the outlet from the gravity tank need be but three inches above the top of the float chamber of the carburetor, which permits locating the carburetor in proximity to the cylinders and in an accessible position.

Two Reservoirs Employed.

Two views of the gravity vacuum system are shown herewith, that at Fig. 1 depicting the device installed on the dash, while that at Fig. 2 is a sectional illustration. By referring to the latter it will be noted that the tank consists of two chambers, a filling and a reserve. The upper compartment is the filling, and the lower has a capacity of about one quart of fuel, this amount being held in reserve at all times.

The filling of the tank is accomplished by tapping the intake manifold at a point nearest the cylinders and utilizing the suction of the intake to draw fuel from the main tank into the smaller vessel. About one twenty-fourth of a gallon is drawn into the small tank at each float operation. It is stated that the pressure utilized does not affect the mixture or modify the operation of the motor.

The fuel drawn into the smaller tank actuates the float and, when the last named member rises to a certain position, it automatically shuts off the supply of air and opens the tank to atmospheric conditions, so that the filling of the upper compartment in no way interferes with the amount of fuel which is supplied to the carburetor.

The operation of the system will be made clear by noting the diagram shown at Fig. 2. C

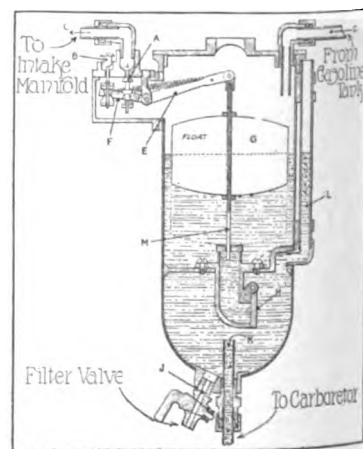


Fig. 2—Diagram Showing Components of Stewart-Warner Gravity Vacuum Fuel System.

is the line to the intake manifold, and while the drawing does not show it, a small check valve is located in this line just above the valve A, which is the suction valve for opening and closing the connection from the intake manifold and through which the vacuum is forced. D is the line to the main supply.

The atmospheric valve is shown at B and is in an open position. It is stated that it is impossible to have both valves A and B open at the same time, that no particular adjustment of these members is necessary, and that opening the suction valve from .03125 to .25 inch will not affect its operation, hence a fine adjustment is not essential.

Function of Valves.

The operation of the valves A and B is regulated by the float G in the upper chamber, and the float is shown in its top position, just after the compartment has been filled with fuel. The suction valve is closed, and the atmospheric valve, having opened, fuel is flowing from the upper chamber to the lower through the trap valve H. The gasoline in the lower chamber is always under atmospheric pressure, due to the air vent L, which is always open. It is stated that the suction in the top chamber of the tank does not interfere with an even, continual flow of fuel to the carburetor from the lower chamber, because the suction closes the valve H while the upper compartment is being filled.

As gasoline in the upper chamber flows into the lower, and upon the float attaining its maximum low position, the lever E is lowered to such a position that it actuates the valve lever F, and this in turn closes the valve B against atmospheric pressure. The valve A is opened when the suction from the intake manifold begins to draw fuel from the main tank.

Convenient Filter.

The connection to the carburetor is through the line at K. This extends about one inch above the bottom of the lower chamber and prevents water or sediment from reaching the carburetor. Foreign elements thus trapped may be displaced by opening the filter valve J. The latter makes for convenience when a supply of fuel is desired for priming or cleaning purposes.

It is stated that, should the lower tank be empty, only three to five turns of the motor with the throttle closed are necessary to draw enough fuel into the chamber to permit of starting the engine. The only time the suction from the tank shows an effect on the speed of the motor is when the engine is turning over at a very low rate of speed and when idling, and it is stated

that the change is hardly noticeable. Under normal conditions the suction valve is open but approximately two seconds.

Relative to the possibility of fuel being drawn into the intake manifold, it is stated that less than a teaspoonful has been noted in tests and that only when the motor was operating under a load for a period of one hour. It is held that this was due to what little saturation there was in the air, because of its coming in contact with the fuel.

Advantages of System.

Under normal operating conditions the fuel pressure in the carburetor is said to vary but one-quarter of an ounce. Danger of the suction or atmospheric valve sticking is eliminated by the small lever or bar to which these members are attached, it travelling about .25 inch above and striking the valves. The springs attached to the levers are constructed of No. 28 gauge bronze, and have a stretch of .125 inch, making for durability.

The advantages claimed for the Stewart-Warner gravity fuel system are: Ease of installation, steady flow of fuel to the carburetor at an even pressure, elimination of air tight connections, gauges, valves, etc., filtering of the gasoline and locating the carburetor in an accessible position as well as in proximity to the water jackets of the cylinders.

ELECTRIC BICYCLE.

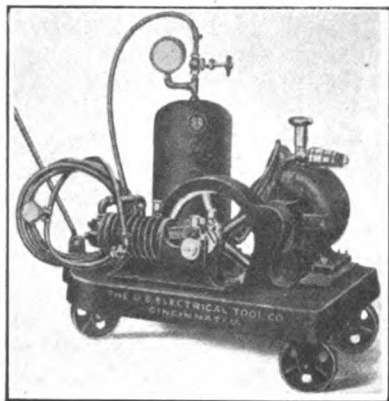
Vaudeville Performer Utilizes Gray & Davis Electric Motor Starter to Propel Machine.

A novel application is noted of an electric motor starter, such as is employed on automobiles, in the application of a Gray & Davis motor to a bicycle. The starter is attached to the bicycle below and directly in front of the usual driving sprocket by clamps. The usual pedal shaft is replaced by a countershaft, this being actuated by silent chain. Final drive to the rear wheel is by the conventional block bicycle chain.

Six-volt storage batteries are utilized to energize the electric motor, the cells being stored in containers on either side of the rear wheel, and mounted on a special frame. Control of the current is by an ordinary knife switch operated by the foot. By wiring the cells in series multiple, the inventor, E. J. Barsden, 446 West 46th street, New York City, claims that he is able to attain a speed of 25 miles an hour for over six hours with the batteries fully charged. The bicycle is utilized by Mr. Barsden on the stage, and he also employs it for pleasure.

MACHINERY, TOOLS, EQUIPMENT AND SUPPLIES.

THE U. S. Electrical Tool Company, Cincinnati, O., is marketing the U. S. electrically operated garage pump shown in the accompanying illustration, and the maker states that it is constructed to withstand severe service. The complete equipment comprises an electric motor, single-cylinder compressor, air tank, suitable length of air hose, lamp cord and socket, gauges, etc., these being mounted on a low truck having caster wheels.



U. S. Electric Air Compressor.

Single castings are largely employed, the pump cylinder, bed and bearing brackets being cast in a single piece. The compressor has a single horizontal cylinder with deep air flanges for cooling, and is driven through a single gear reduction, there being a small pinion on the motor shaft and a very large gear on the pump shaft. Energy is supplied by a .25 horsepower Westinghouse motor, and the current supply is from the lighting system of the building, armored cable of suitable length and a rugged connector being provided.

The crankshaft bearings of the pump are very liberal in size and are retained by bolted-on caps, a method insuring easy removal and adjustment. Lubrication of the compressor is by three oil cups, one on each of the shaft bearings and the third in the cylinder. The method of motor lubrication is such that it will not require attention except after long periods of service.

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Air is pumped from the compressor to the tank, which is 12 inches high and six in diameter, and means are provided to trap any oil or moisture that may be present. Nothing but pure fresh air is pumped to the tires. The air hose is unusually long and constructed to meet the requirements of garage service. It is provided with a gauge to indicate the pressure, and the tank is equipped with a similar member of ample size. The usual shut off valve is included.

The maker calls special attention to the efficiency of the outfit, stating that it will inflate a

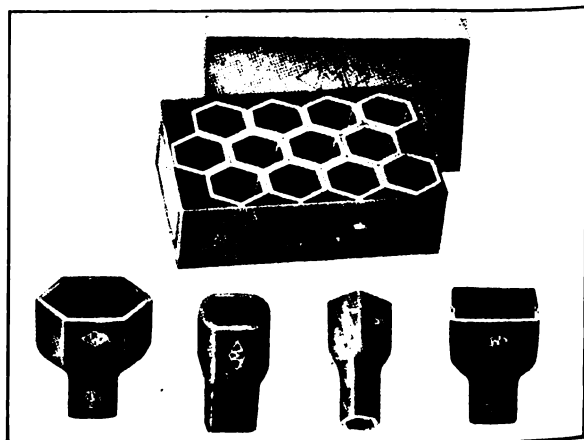
35 by four-inch tire from flat to 70 pounds in 15 minutes. The truck and wheels are of metal, and the equipment may be moved easily about the garage, a convenient handle being provided for this purpose. The U. S. Electrical Tool Company will supply additional details on request, also trade prices.

MOSSBERG SOCKET BRACE.

The Frank Mossberg Company, Attleboro, Mass., is manufacturing the Mossberg socket brace No. 360, shown in an accompanying illustration. A brace is a decidedly handy tool in the repair shop and garage and may be employed for a number of useful purposes, such as grinding in valves, removing the nuts of demountable rims, working about the power plant, etc.

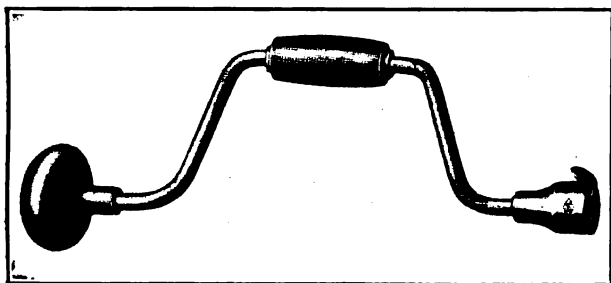
The Mossberg brace is very efficient, being constructed of the finest grade of steel, dull nickel plated and with ebonized wood handle. It is 13 inches over all and is covered by the usual Mossberg guarantee. The chuck end of this brace holds all sizes of Mossberg sockets and those having a standard shank. The brace is moderately priced.

The company makes a specialty of pressed steel sockets, some of which are shown herewith. The product of the concern is well and favorably known among repairmen and the trade, as the sockets are constructed of pressed steel and hardened, and by their mottled finish. They fit hexagon and square nuts, set screws, and bolt heads. One of their qualities is that they are standard and will fit practically every socket set that is now on the market.



Mossberg Pressed Steel Sockets and Container.

They are produced for U. S. standard hexagonal nuts and bolts, A. L. A. M. standard hexagonal nuts and screws, manufacturers' standard

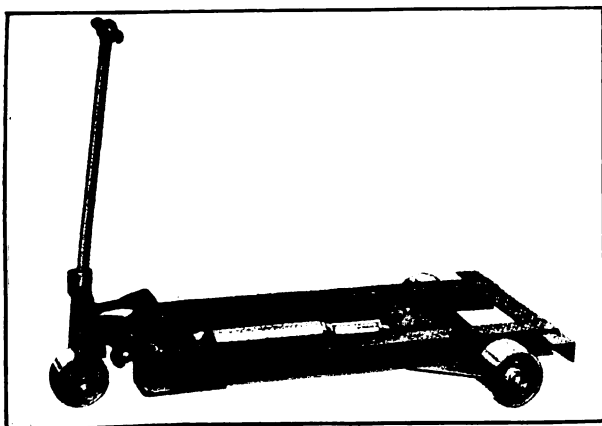


Mossberg Socket Brace No. 300.

hexagonal headed bolts and for cap and coach screws. The maker calls special attention to the necessity when specifying, that dimensions of nuts should be given measured "across the flats", or, in other words, the smallest diameter of the nut or bolt head, and, unless the actual size of the socket is ordered, an allowance is made by the company of .03125 inch for clearance. The Mossberg sockets are marketed in attractive boxes, each containing one dozen. Prices and complete list of sizes will be mailed upon request.

COWAN TRANSVEYOR.

The Cowan Truck Company, Holyoke, Mass., is manufacturing the Cowan transveyor, shown in an accompanying illustration, which is produced in four sizes, having capacities of 2000, 2500, 3000 and 3500 pounds respectively. One of the qualities of the truck is that it is an all-metal construction. It is designed to operate over rough floors, up and down inclines and with the platforms is held to save considerable time and

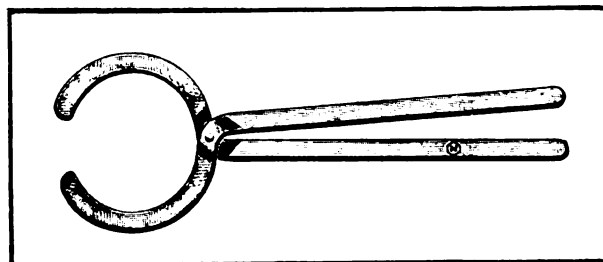


The Cowan Transveyor Which Is Utilized with Special Platforms.

labor in the transportation of material about the factory. It is pointed out by the maker that fully 75 per cent. can be saved in the ordinary factory equipment.

One of the features of the transveyor is its ample clearance when the platform is elevated, this being 2.75 inches. The type H transveyor is equipped with a specially designed hydraulic ram, and a few strokes of the handle will elevate maximum loads to a height of three inches, a clearance eliminating possibility of skids catching or encountering obstructions at the foot or top of inclines. It is stated that there is no possibility of the load being released until the operator presses a pedal, when the platform will slowly sink to the floor without shock or jar.

The front wheel of the all-steel construction is fully swivelled, making it possible to turn the machine in its length. The high grade ball bearings are protected by washers and dust caps, and the steering handle is at all times free, enabling the workman to guide the machine easily and accurately. The design of the handle is such that a



Nelson Ford Platen Ring Clamp.

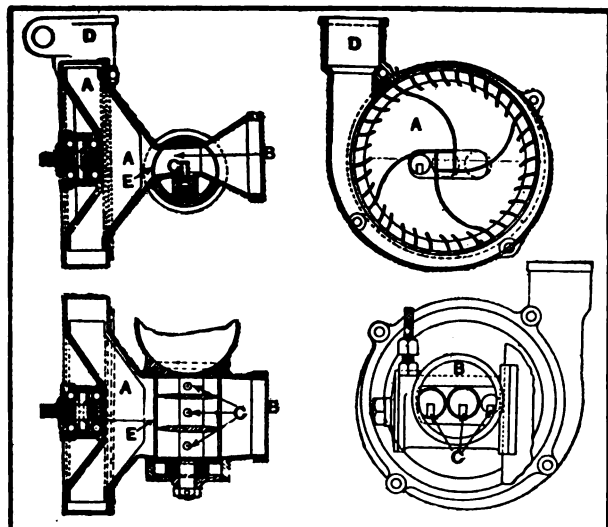
straight pull is provided when removing the transveyor from beneath a platform. The wheels are six inches in diameter for the No. 1 and 2 types and seven for the others. The type H will be supplied with 10-inch wheels if desired. Specifications, dimensions and prices will be forwarded upon request. John Cronin, 118 Pearl street, Boston, is agent for the Cowan Truck Company.

FORD PISTON RING CLAMP.

The Nelson Manufacturing Company, 564 West Randolph street, Chicago, is marketing a number of Ford specialties, among which is a piston ring compressor shown in an accompanying illustration. It is designed especially for the Ford motor and could be employed with other engines the pistons of which are of similar diameter. The operation of the Nelson tool is obvious. It is placed about the ring and by exerting a slight pressure on the handles the ring is fully compressed. The tool is inexpensive and will save considerable time when replacing rings.

ROOTS CARBURETOR USES FORCED INDUCTION.

IT IS stated by an authority on carburetion that when any ordinary type of carburetor is employed, the cylinders of the engine do not at any time receive a full charge of mixture. This is said to be due to the fact that the mixture is drawn into the engine by the partial vacuum caused in each cylinder by the downward movement of the piston on the intake or suction stroke. This defect in the supply of fuel to the engine is held to be more pronounced in some motors than in others, for the timing and the lift of valves have a great deal to do with the matter. For example: If an inlet valve closes too early the amount of mixture drawn in is less than if the valve remained open for a more or less lengthy period after the piston had reached the



Four Views Illustrating Components of Roots Carburetor Utilizing Forced Induction.

bottom of the suction stroke; advantage would not be taken of the momentum of the intruding mixture.

To insure a full charge at all times when the throttle is open is the object of the Roots carburetor, designed by J. D. Roots & Company, London, England. It provides forced induction, a powerful Davidson type of fan being embodied, the duty of which is to draw air past the jets and force the resultant mixture into the cylinders. By this means, mixture under pressure is sent into the cylinders as each inlet valve opens, and the inductive effect of the descending piston or intake stroke is in no way relied upon.

Accompanying sectional drawings show a design in which this principle is embodied. The fan A, which has a large number of very small

blades on its periphery, is intended to be rotated by a pulley or chain ring which would be fitted on the screwed outer end of its spindle. Air is drawn through the bell mouthed inlet B past the jets C, and is forced by the fan blades into the induction pipe outlet D. A rotating sleeve throttle is provided, as shown at E, and this covers or uncovers one or more of the three jets C. These jets are located in separate choke tubes as shown in the bottom right hand view. The throttle is operated by a Bowden wire connection.

It is stated that the carburetor is very efficient, that tests resulted in a car negotiating a grade on the high gear that formerly required use of the second and low with an ordinary carburetor. It is also claimed that with fully open throttle the power of a motor will be increased from 40 to 50 per cent. The effect upon the valves, bearings and other working parts of a motor is not stated.

NOVEL TIME PAYMENT PLAN.

Gerlinger Company Buys Notes from Sub-Agents, Saving Investment of Capital.

The Gerlinger Motor Car Company, Portland, Ore., which has branches in several cities in Washington and Oregon, has developed a plan for time payments which it is maintained will be satisfactory and work out to the benefit of all concerned. This applies to all of the agents for the company who sell trucks on time payments, receiving notes for the balance remaining unpaid. Instead of the agents holding the notes these are purchased by the Gerlinger Motor Car Company, charging for this a nominal sum. Thus the company holds the notes that are made payable to the sub-agents, instead of holding them as direct payments, the benefit being that the sub-agent can deal with those who wish to make time payments and need not himself invest his own capital.

EQUIPPING THE GARAGE.

The purchaser of a new machine who intends to attend personally to its upkeep, will find many valuable suggestions dealing with the selection of the garage equipment in the annual overhaul and equipment number of The Automobile Journal of April 25.

INGENIOUS METHOD OF PLATING METAL.

AN INGENIOUS method of plating almost any surface with metals which are melted fairly easily, such as brass, aluminum, copper, tin and zinc, has been invented by E. U. Schoop, a well known German chemist. The device utilized resembles somewhat a spraying pistol, which is illustrated diagrammatically herewith.

The pistol is provided with a handle, in proximity to which is a supply tap which controls the feed of compressed air and gases used for fusing the plating metal. The gases consist of oxygen and hydrogen, and are supplied by a small tube to the nozzle. Passing through the nozzle is a metal wire, which forms the plating material. Supposing brass is to be used: This wire is about one millimeter (.03937 inch) in thickness, and is gripped between a pair of friction wheels, which are rotated by means of a turbine acted upon by compressed air. Between the turbine and the feed wheels are two worm reductions.

In operation the gases and compressed air are turned on, the former causing a fusing flame to issue from the nozzle, and the air serving, by means of the turbine, to feed the wire to the nozzle. The compressed air also issues in the form of a blast from the nozzle, so that the fused metal, in the form of a spray, is projected with considerable velocity against the surface to be plated, which may be wood, paper, cloth, etc., as well as metal. By varying the feed of compressed air and gas, the speed of operation can be changed and the thickness of the plating deposited can be varied.

About 900 grams of copper or brass can be deposited in an hour, the wire being fed at the rate of about 12 to 15 feet a minute. The process is of interest to motorists, as it suggests a method of plating chassis parts without dismantling or removing them from the car.

TO MANUFACTURE BENZOL.

United States Steel Corporation to Produce Fuel from By-Products of Coke.

The United States Steel Corporation has appropriated \$400,000 for the construction of a plant to manufacture benzol from the by-products of the coke plant of the Carnegie Steel Company at Farrell, Penn. The corporation is said to have had the plan under consideration for some time, and up to the present has been manufacturing coal tar and sulphate of ammonia from

the by-products at the Farrell plant. Benzol is being widely used abroad as a motor fuel, and the production of it in this country will add a new interest to motoring, particularly as benzol can be satisfactorily employed with commercial vehicles.

PROPOSES BOSTON-CHICAGO RUN.

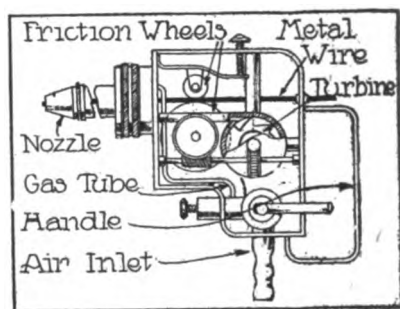
Chicago Automobile Club Agitating Non-Stop Run for July—Approved by Head of A. A. A.

The Chicago Automobile Club is booming the Chicago-Boston day and night non-stop motor reliability run, which it scheduled last summer, but which was postponed because of inability to secure a stock car class. The club aspires to have the Glidden Trophy for the main prize. It is stated that the visit of President Wilson of the American Automobile Association to Chicago recently was responsible for the revival of the plan. It is stated that he tendered to President Vissering of the Chicago club the Wilson cup for the touring car that can show an average speed of a mile a minute over a measured mile course. This same cup was offered at Indianapolis four years ago, but was never won.

The run is tentatively scheduled for July, but details will not be made public until it is known whether or not a stock car rule can be agreed on. It is planned to run off the Wilson trials in September. The conditions require that each car carry four passengers of an average weight of 160 pounds and be fully equipped. There must be two trials, one each way of the course, and the average time will be taken.

BRISCOE COMPANY A MEMBER.

The Briscoe Company of Jackson, Mich., of which Benjamin Briscoe is president, has been admitted to membership in the National Automobile Chamber of Commerce.



Illustrating the Construction of the Schoop Plating Device.

IN THE COMMERCIAL VEHICLE FIELD.

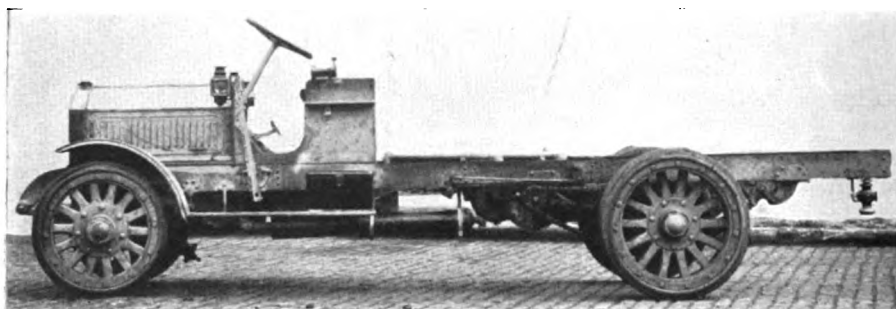
Constructional Details Concerning Hexter Gasoline-Electric Vehicles Announced from New York--Palmer-Moore Company Has Water-Cooled Model.

AFTER experimentation covering some little period, the Roland Gas-Electric Vehicle Corporation was organized in New York City last autumn for the purpose of producing the Hexter gasoline-electric line of trucks, designed by Percy K. Hexter. Quite apart from the fact that these models, of which there are now four, add another make to the list of so-called combination types, the design and construction are such as to merit consideration.

In reality there are two designs, one of which is produced in five and seven tons capacity, and the other, in 1.5 and 3.5 tons. Certain characteristics appear in all sizes, such as the use of a carburetor that is not adjustable, ignition system that eliminates hand control, the governing of the motor to a specific maximum speed, and the elimination of the clutch. It will be understood

stated that the power plant and electric generator installation is the same with all models, except for the dimensions. But one electric motor is utilized in the 1.5 and 3.5-ton machines, this being suspended on a sub-frame that carries the gasoline engine and generator. The driving end of the armature is coupled to the main shaft by a universal joint, and the drive shaft extends to the worm drive mounted in the rear axle housing. This axle is of the full floating type, and the driving thrust is taken through the rear springs, which are shackled at the rear ends only.

The accompanying illustration presents the seven-ton machine, which, with the five-ton model, utilizes two electric motors, these being suspended in the main chassis frame, one forward of and the other behind the jackshaft. The forward motor drives the right side of the jackshaft, and the other the left side, the jackshaft really being two separate shafts that are driven independently of each other. The pinion ends of the armature shafts carry sprockets, which are aligned with larger sprockets on the driving shaft, and these are driven by enclosed silent chain. Drive to the rear wheels is by side chains. There is no differential, the divided jackshaft taking its place, driving thrust being taken by radius rods.



Hexter Seven-Ton Gasoline-Electric Truck, an Interesting New Design Recently Brought Out by New York Concern.

that the gasoline motor is coupled to the electric generator, and this is driven to whatever speed is necessary in order to secure the desired maximum power output from the electric motor.

The generator, in each instance, is a product of the General Electric Company, and is designed to have high efficiency and long endurance. It is compound wound and is arranged to maintain a voltage as nearly uniform as practical, so that increasing the speed of the gasoline motor is held not to add greatly to the voltage, although the amperage is increased and the electric motor is supplied with a greater volume of current. The governing of the gasoline motor is held to insure against excessive speed and protects the electric motor.

With the two smaller sizes the gasoline motors are of the Waukesha make, and it may be

TRACTOR UTILIZES RUNNERS.

Novel Experiment to Overcome Difficulties Attendant Upon Heavy Snowfall.

An accompanying illustration presents a Knox-Martin tractor, made by the Knox Automobile Company, Springfield, Mass., fitted with large runners shod with steel and shaped to be clamped to the free wheels of the combination for affording better traction in heavy snow. The experiment was made, with excellent success, during a recent heavy snow storm in Springfield, and it is stated that the machine was easily controlled and traction was at all times sufficient, no



Knox-Martin Tractor, Fitted with Runners Utilized in Experiment Made by the Knox Automobile Company, Springfield, Mass.

matter what depth of snow it was in. Similar tests have been made with other types of motor vehicles in other cities, and it is not unlikely that something of this nature will be evolved which will prove of service in aiding fire department apparatus, for instance, to overcome the difficulties attendant upon heavy falls of snow.

FAMILY DELIVERY OF COAL.

Some Interesting Results of Year's Experience With Pierce-Arrow Trucks.

Olney & Payne Bros., Pawtucket, R. I., has been operating a fleet of three five-ton, worm driven Pierce-Arrow trucks in the retail delivery of coal for the past year. In fact, one of the machines has been in service about 18 months. The results which have been obtained are such as should prove of interest to others who may be considering the purchase of vehicles for a similar service.

The first machine was purchased to handle contract orders for some of the large factories in the city, and the success which attended its use was such that a second one was ordered shortly thereafter. This was delivered the morning of the second day of a teamsters' strike, and as a result of

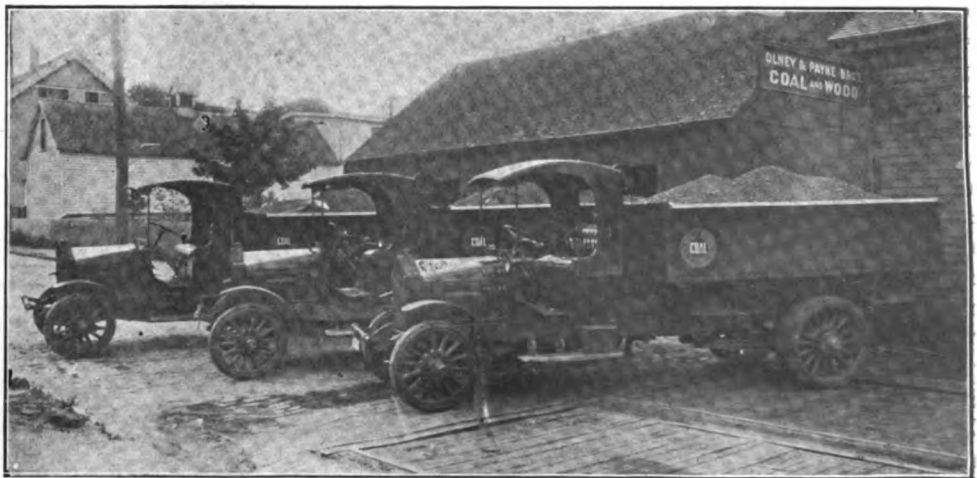
this emergency, the third vehicle was ordered for delivery as soon as possible.

Because of the desire to overcome any and all difficulties arising from the labor trouble, the three trucks were set at work handling all kinds of coal orders, including those for family use. The company offered 50 horses and a number of carts for sale, about the same time,

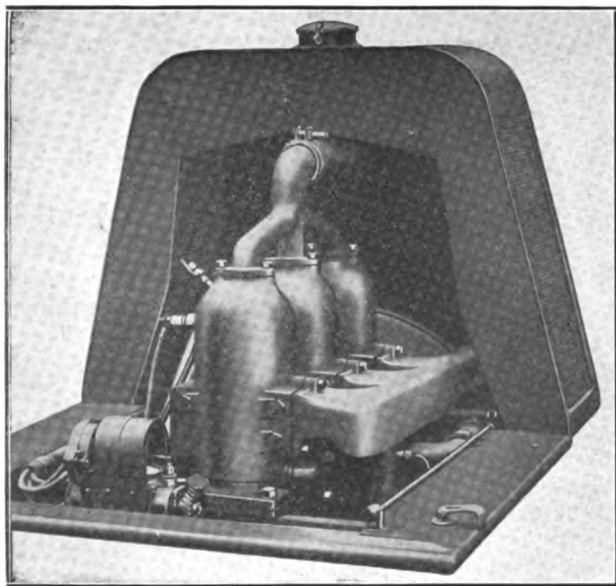
so that there has been abundant opportunity to judge of the possibilities in this field.

It will be understood that the trucks are fitted with specially designed dumping bodies for the quick handling of contract orders. Comparatively few houses are built so as to permit of using these bodies as intended, so that it has been found desirable to add two men to each truck crew to facilitate the work of unloading. Under these conditions it has been found possible, with full loads and efficient operation, to do the work at about the same cost as with horses. The average mileage of the trucks is approximately 50 each day, although as much as 75 miles have been driven to meet some special conditions.

The point which it is desired to make, is that the trucks can be operated with decided economy in the handling of contract work, since this was the factor which determined the purchase of the additional machines in the first instance, and can



Three Five-Ton, Worm Driven Pierce-Arrow Trucks, in Service with Olney & Payne Bros., Coal Dealer, Pawtucket, R. I.



Palmer-Moore Water-Cooled Motor, and Its Location in the Chassis.

be made to handle family orders as cheaply as horses.

PALMER-MOORE'S NEW MOTOR.

Water-Cooled Model Has Been Added for Those Who Prefer This Type.

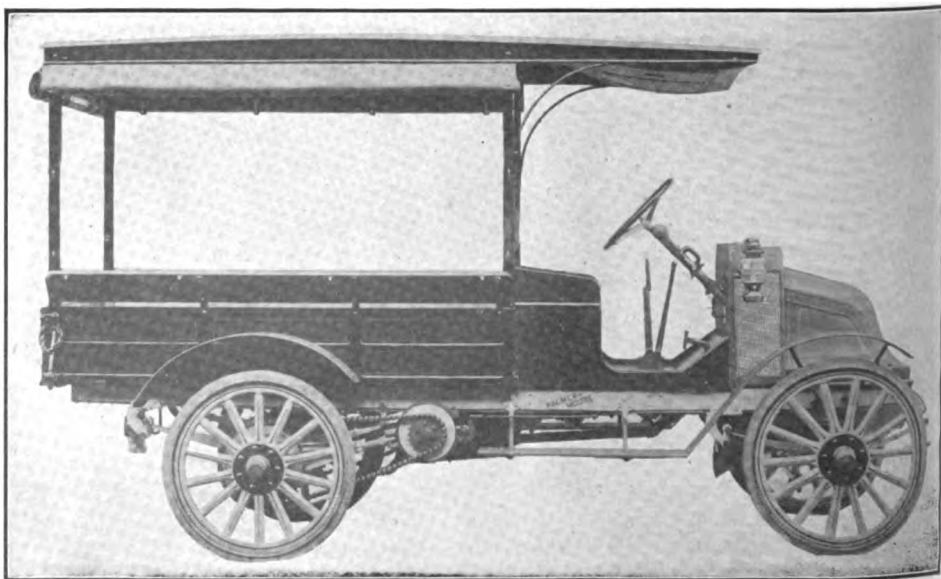
While the Palmer-Moore Company, Syracuse, N. Y., is well known in the industry because of its production of commercial motor vehicles utilizing a three-cylinder, two-cycle, air-cooled motor, it is of interest to note that this concern has added a new model, which is equipped with an engine of practically the same design, except for the fact that it is water-cooled by the thermo-syphon system. It is explained that this has been developed to meet the demands of those who prefer a water-cooled motor.

The design of the Palmer-Moore engine is somewhat out of the ordinary, it being maintained

by the maker that it is the height of development in the two-cycle field. The cylinders, which have a bore and stroke of four inches, are cast separately, with wide horizontal external flanges or fins about the expansion chamber, and vertical flanges about the head. This construction applies primarily to the air-cooled type. The combustion chamber is spherical. Oil ducts extend from the base of cylinder in the walls to a point just below the top of the piston when at its lowest point. These ducts are never open at the top, but they are held always to be full of gasoline mist, permeated with oil (the same as that consumed as fuel), and that this lubricates the walls of the pistons, the cylinders and the ends of the wristpins, affording positive lubrication and insuring against loss of power. The pistons are constructed with air chambers at the heads, which are held to prevent the heat of combustion overheating the piston heads, rings and wristpins.

A distinctive feature is the valve construction. Instead of the usual form of inlet ports, which are constant with two-cycle engines, the fuel is admitted through ports that are fitted with rotary shutters, connected with linkage and set at any desired position for the immediate requirement. It is maintained that precise control is afforded by varying the opening of these ports, and that the operation of the motor is at all times smooth and even.

When operated in normal conditions and for ordinary work the motor can be best used at from 600 to 700 revolutions a minute, but should



Palmer-Moore 1600-Pound Wagon, Equipped with Latest Type of Water-Cooled, Three-Cylinder, Two-Cycle Motor.

there be occasion the speed can be increased to 1000, which is a reserve for climbing grades, rough roads, sand, or where special power is essential. The statement is made that the ports are productive of a large fuel economy and that there is all the advantage of a low speed engine, minimizing the wear on all bearing surfaces and reducing the probability of overheating. Another factor is the lessened noise of operation. The vibration is also correspondingly reduced.

An accompanying illustration shows the new water-cooled engine, and indicates its location, with the vertical tube radiator incorporated with the dash, and the French type hood, which is lifted from the front to permit of free and full accessibility. The water manifolds are large and the connections are ample for all requirements. Ignition is by Bosch high-tension magneto, with fixed spark, and no other control of the engine is necessary than adjustment of the fuel supply throttle.

Another illustration presents the completed vehicle. The clutch is a three-plate type, with a steel centre plate mounted between two fibre discs. The transmission is a planetary gearset, affording three forward

speeds and reverse, this being assembled as a unit with the jackshaft, with the service brake drums on the outboard ends. The emergency brakes are internal expanding on the rear wheel hubs. Springs are semi-elliptic. The wheels are of the artillery type, carrying 36 by 2.5-inch tires in front and 36 by three-inch in the rear. The capacity of the chassis is rated at 1600 pounds.

CONTRACT STORE DELIVERY.

Equipment Having Private Ownership Appearance Supplied by Cleveland Concern.

The Delivery Company, Cleveland, O., which is now operating a fleet of electric wagons and

several gasoline trucks for general transportation and distribution in that city and suburbs, specializes in two directions. It will make contract to deliver goods of any store on a basis of packages, or it will furnish those who desire to operate personally any type of vehicle with driver at a flat monthly rental.

The company is serving more than 200 different stores, and for a number of firms machines have been provided that have all the appearance of private ownership, being finished with panel bodies bearing the names of the concerns using them, and decorations or lettering that have a distinctive advertising value. Of course, such vehicles are not utilized for any other purposes than those of the firms renting them, and being devoted exclusively to such service they are con-



Type of Baker Electric 1000-Pound Wagon Utilized in Unique Service Furnished by Concern in Cleveland, O.

trolled as though they were owned by them.

When a machine is rented, the price includes the service of the vehicle, the driver, attention, care, maintenance and every detail of operation, the company storing the wagon in its own garage, having all the work done by its mechanics, and systematically maintaining and operating it. The accompanying illustration shows one of the machines, a Baker electric 1000-pound wagon, and indicates the character of equipment provided for those who desire to rent a vehicle in this manner. The plan is meeting with decided success in every respect.

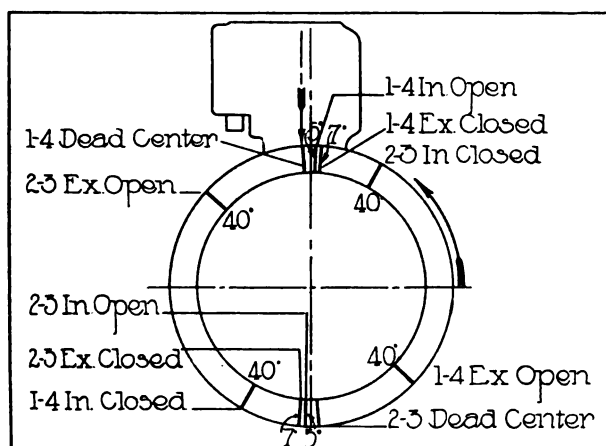
The equipment of the Atlantic Vehicle Company's plant at Newark, N. J., will be sold by referee in bankruptcy. Bids will be opened April 15.

MECHANICAL NOTES FOR OWNERS.

Explaining Flywheel Markings Utilized for Timing the Valves of the Models C, H, N and T Regal Motors--Dish or Camber of Front Wheels.

THE valves are important factors in the operation of an internal combustion engine, and with a four-cylinder, four-cycle motor there are eight of these members, four intake and four exhaust. Their function is to admit the mixture to the cylinders and to permit of the exit of the burned gases. The intake opens when the piston is at approximately the top of its stroke; is closed during the succeeding compression, firing and exhaust stroke. The operation of the exhaust valve is somewhat similar, differing in that it opens when the piston has completed the downward movement and is moving upward. Like the intake it is closed during three strokes or 1.5 revolutions of the flywheel.

It is important that the valves open and close



Valve Timing Diagram of Models C, H, N and T Regal Motors—The Markings Indicate the Correct Opening and Closing Points of the Valves.

according to the factory timing diagram if maximum efficiency is to be obtained from the motor. The factor of mixture is not considered in this discussion. As the valves are actuated by cams, and these are mounted on a shaft driven by the crankshaft, the latter making two revolutions to one of the camshaft, the periphery of the flywheel is utilized to indicate the valve timing.

While at first glance it would appear to the novice that the markings are confusing, they are easily understood if one takes into consideration the operation of a four-cycle motor; that is, the strokes and the number of revolutions of the flywheel.

In an accompanying illustration is shown the

valve timing diagram of models C, H, N and T Regal motors, which is as follows: Intake opens five degrees past centre and closes 40 degrees past centre; exhaust opens 40 degrees past centre and closes seven degrees past centre.

On the rim of the flywheel will be found markings corresponding to those in the illustration, which is drawn to represent the periphery of the flywheel and its marks. It will be noted that there are two lines diametrically opposite each other, the one at the top being 1-4 and the bottom 2-3. These indicate the dead centre positions of the pistons of the first and fourth and second and third cylinders respectively. These marks are essential in valve and ignition timing.

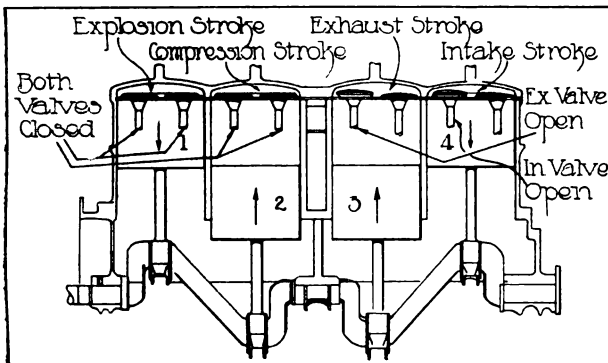
It will be seen that there is an arrow drawn on the cylinder and this is the indicator. When the marks previously referred to register with the arrow, the dead centres are obtained. The arrow is also employed to time the opening and closing points of the intake and exhaust valves.

Assuming that the timing is to be checked: The first step is to open the petcocks to relieve the compression, or the spark plugs may be removed. Next rotate the flywheel to the left until the line 1-4 is opposite the centre line of the cylinders. At this point the exhaust valve of either the No. 1 or No. 4 cylinder should just commence to close. If it is found that the valve of the No. 4 is closing and that of the No. 1 is desired, rotate the flywheel one complete revolution, which will bring the No. 1 valve in position, or so as to register with the arrow. Turn the flywheel about an inch more until the line marked 7 coincides with the arrow. This is the point at which the exhaust valve should just seat or close.

The tappet or pushrod of this valve should not be in contact with the valve stem. If it is, the valve will not entirely close. If there be too much space it will indicate that the valve is opening late and this will be noted easily, as the mark of the flywheel will be past the arrow when the valve begins to seat. The valves are adjustable and by loosening a locking nut and turning the tappet screw up or down the tappet can be so set that the valve will close or open according to the marks on the flywheel.

The inlet valves are checked in the same cylinder by turning the flywheel to the right until

the line 1-4 coincides with the arrow, then turn the flywheel about .75 inch to the left until the line marked 5 registers. At this point the inlet



Sectional View of Model T Ford Motor, Illustrating the Different Strokes of the Pistons and Valves Open and Closed.

valve should just begin to open. The closing point is checked by rotating the flywheel to the left a half a turn, stopping when the line marked 40, just to the right of the line 2-3, registers with the arrow. At this point the inlet should just close.

Any variations from the flywheel markings should be corrected by adjusting the tappets, and if it be borne in mind that each half revolution of the flywheel represents an opening or closing point of a valve, the work will be greatly simplified. A little study of the diagram should enable one to master the valve timing.

OPERATION OF FORD MOTOR.

Many owners of the model T Ford car do not understand the operation of the motor. This subject is discussed in the new manual issued by the Ford Motor Company and the illustrations utilized herein are redrawn from the booklet.

Reference is made to the term cycle, as the Ford motor is a four-cylinder, four-cycle engine having a firing order of 1-2-4-3, which has been employed with all four-cylinder Ford motors. To complete a cycle, or to obtain a power stroke, the piston of a cylinder makes four movements, two up and two down, during which the crankshaft completes two revolutions. These movements of the piston are termed strokes and are as follows: Intake, (piston moves downward); compression, (piston moves upward); firing, (piston moves downward); exhaust, (piston moves upward). It will be seen that but one impulse is obtained during the four strokes which make up the cycle.

The mixture is drawn into the cylinder during the intake stroke, compressed, fired by an electric spark, and the products of combustion are forced out during the exhaust stroke.

An accompanying illustration makes clear these strokes and as the pistons are numbered in sequence, the strokes outlined and valves marked, it should be a simple matter to understand the cycle of operation. In the drawing the No. 1 cylinder (that nearest the radiator) has completed the compression stroke and is about to start downward on the firing stroke. It is approximately at this time that the spark or ignition should occur.

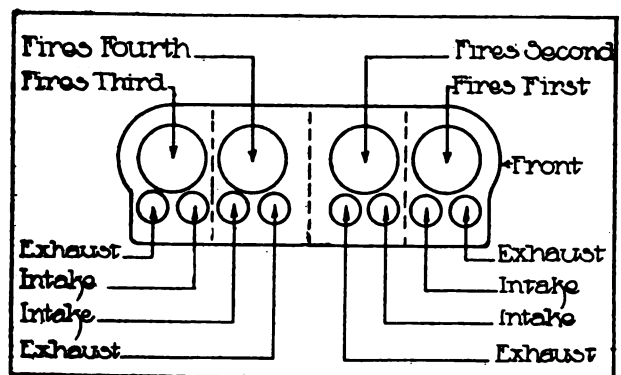
Both valves are closed in the cylinder, as are those in the No. 2, as the latter is about to start the compression stroke. The piston of the No. 3 cylinder is beginning to move upward on the exhaust stroke, consequently the exhaust valve is opening. The No. 4 cylinder is taking in a charge, and it will be seen that the intake valve is off its seat. The intake of the No. 3 and exhaust of the No. 4 are closed. The drawing also shows that when the pistons of the first and

Firing Order 1-2-4-3.

Cylinder 1	Cylinder 2	Cylinder 3	Cylinder 4
1—Firing	Compression	Exhaust	Suction
2—Exhaust	Firing	Suction	Compression
3—Suction	Exhaust	Compression	Firing
4—Compression	Suction	Firing	Exhaust

fourth cylinders are at the top of the stroke, those of the second and third are at the bottom or in a position termed lower dead centre. These points are useful in checking the valve timing and setting the timer.

Another diagram explains the firing order of the cylinders, which is 1-2-4-3. The valves are also lettered. An accompanying table shows the



Showing the Firing Order of the Model T Ford Motor, Also the Valve Arrangement.

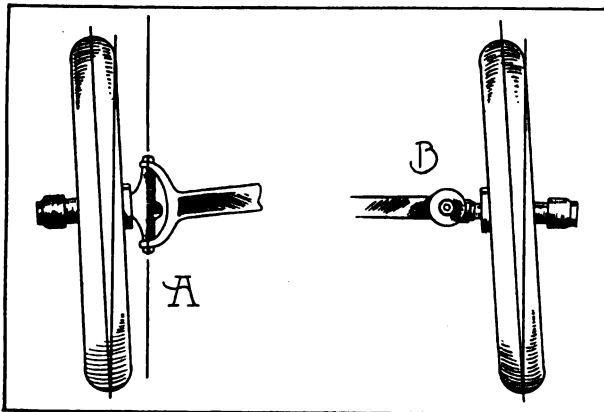
strokes taking place when the piston of the No. 1 cylinder is about to descend on the firing stroke.

In the table the operations are uniformly started at the firing point of the No. 1 cylinder. Since cranks 1 and 4, likewise 2 and 3, in four-cylinder engines, have coincident axes, either 2 or 3 may be made the next in firing order after 1. The Ford motor, however, utilizes the second, as previously explained.

An understanding of the firing order and strokes is important, as the data are of value when rewiring the commutator and coil, and when the leads and their terminals have not been marked to insure correct replacement.

DISH OR CAMBER OF FRONT WHEELS.

Some manufacturers dish the front wheels of their cars, among which is the maker of the Buick. It will be noticed that the wheels do not stand straight that they are closer at the bottom than at the top, and that they toe in slightly in front. The amount of divergence from verti-



Dish or Camber and Gather of Front Wheels: A, Showing the Divergence from the Vertical; B, Top View of Wheel, Illustrating Gather.

cal is termed the camber and involves a mechanical principle—that the nearer to an alignment the centre of the spindle bolt and the pivot point of the wheel are when turning, the easier the car will steer.

The proper amount of camber in the Buick models B 24 and B 25 is 2.125 inches. That is, the bottom of the wheels should be that much closer together than at the top. The measurements should be taken between the edges of the rims, and at diametrically opposite points on the circumference. It is an excellent plan in making this measurement, particularly after an accident, to jack up both front wheels and note if they are true. The correction of the camber is a job for the expert or carriage blacksmith.

The gather of the wheels is to offset the effect of the camber, to make the tires wear more

evenly, and also to prevent the wheels wobbling. This is obtained by bringing the extreme forward sections of the wheels closer together by .4375 inch, and the same method is employed as when noting the dish or camber.

The owner can correct the gather by the tie-rod, which is provided with an adjustable yoke. The pin or bolt securing this member to the steering arm is displaced; the lock nut of the yoke loosened, and the yoke rotated to the right to decrease its length or to the left to increase it. Increasing the length of the tierod brings the front of the wheels closer together, augmenting the gather, while shortening it moves the wheels outward. The bolt retaining the yoke should be securely locked, also the nut clamping the yoke.

GARAGE OWNERS ORGANIZE.

Eastern Proprietors Form Protective Association on Lines of Hotel Keepers' Organization.

The Eastern Garage Keepers' Protective Association has been incorporated in New York City by Chester S. Walz of Glenbrook, Conn.; Thomas C. Walz of Pelham, N. Y., and John A. Sanborn of New Rochelle, N. Y., which has been created by the same interests, and will be maintained with practically the same objects, as is now obtained with the Hotel Keepers' Protective Association. The association will sell membership privileges, which will be good for a year, and during that period will supply its members with the names of all persons whose credit is known to be doubtful, this information being furnished by the members and distributed by the organization, which will serve as a clearing house. The cost of membership varies with the proportions of the business.

CONFIDENCE A REQUISITE.

Teacher Says It Is the Main Factor in Developing a Skillful Woman Operator.

According to Miss Frances J. Thornton of Brooklyn, N. Y., one of the few women instructors in automobile driving, the main factor which makes a skillful driver is confidence in oneself and knowledge of the car. She holds that there would be a larger number of women drivers if they would overcome the fear which seems to overtake a beginner, and that the general adoption of the motor starter and lighting system will result in thousands of women operating motor vehicles.

GERMAN CAR STATISTICS.

On Jan. 1, 1913, There Were 57,341 Machines, of Which 49,760 Were Pleasure Cars.

According to statistics supplied the Department of Commerce by one of its European consuls, there were 57,341 motor vehicles in the German empire on Jan. 1, 1913. Of this number 49,760 were pleasure cars and the balance trucks.

The statistics further show that in 1911 there were 113 automobile factories in the German empire, which employed during the year 28,694 persons, with an aggregate salary for the year of \$10,723,566.

The output of machines for 1911 was 11,692 complete cars and 5247 chassis. Of the completed machines 10,319 were passenger vehicles and 1375 freight cars. A further division of the passenger automobiles shows that 4504 were of six horsepower and under, 4269 of six to 10, 1333 from 10 to 25, and only 213 over 25 horsepower.

In 1911 301 trucks were constructed having a carrying capacity of one ton, and 1072 of over that amount. The total value of the 1911 production in the motor car industry was \$38,796,856. The value of the 1912 production was estimated at \$47,600,000.

In 1911 there were 18 factories engaged in the manufacture of tires for motor vehicles, these employing 310 persons. The paid salaries totalled \$2,889,320. The division of tires shows pneumatics manufactured to the value of \$16,860,396, and solid tires to the value of \$4,312,084. Bicycle tires to the value of \$10,987,032 were manufactured. The majority of tires used on German motor vehicles are of German manufacture, although some French makes are becoming popular.

USE OF DENATURED ALCOHOL.

It Is Estimated That Germany Consumes 40,000,000 Gallons Yearly.

According to Charles A. Crampton, commercial agent of the Department of Commerce, Germany uses between 40,000,000 and 50,000,000 gallons of denatured alcohol yearly, of which 30,000,000 gallons are sold to the general public for burning purposes. The importance of this fuel in Germany may be appreciated when it is considered that France uses about 18,000,000 gallons, the United States about 10,000,000, and the United Kingdom only 4,000,000.

According to the monograph issued by Mr. Crampton, copies of which may be procured from

the superintendent of documents, government printing office, Washington, D. C., denatured alcohol is not only gaining in favor for general burning purposes, but a determined effort is being made to find a way to use it as a motor fuel in place of gasoline.

MOTOR CARS IN WAR.

Officers of Both Armies in Mexico Replace Horses with Packard Automobiles.

The automobile is replacing the horse in Mexico, it being utilized by the officers of both armies. A Packard six-cylinder car was purchased recently by Julio Madero, a brother of the late president of Mexico, as a gift to General Obregon, commander of the northern division of Carranza's troops. Madero purchased the machine from a dealer in Phoenix, Ariz., and has practically abandoned the horse.

General Villa also uses a Packard in covering the field. The tonneau of the car has been equipped with special auxiliary seats for members of the staff.

Over 50 Packard vehicles are operated by the federal government in Mexico. They enable army officers to cover a vast amount of ground, and are used also for rapid mobilization of small bodies of troops. The roads in Mexico are held to be very bad.

FIRST CYCLECAR RACES.

Will Be Held at Dr. Percival's Farm, Teaneck, N. J., on Memorial Day.

Dr. Charles G. Percival, who is president of the Cyclecar Club of New Jersey, announces that the first cyclecar competition ever held in this country will be inaugurated on May 30 at the Memorial Day run of the New Jersey Association.

The contests will take place at Teaneck, N. J., and the programme arranged is as follows: Accelerator race of 50 yards; starting cold motors; high average speed event; speed up contest, standing start, one in six; slow race on high gear (miles per hour); fuel economy (pint of gasoline); accelerating contest (standing start); reverse race, 45 yards up grade, and a hill climb.

It is stated that the makers of the Imp, Scripps-Booth, Twombly, Mercury and Economy cars have made entries. The entire association will be the guests of Dr. Percival during the day at his farm at Teaneck, and luncheon will be served previous to the events.

IMPROVED ROADS AND MOTORING LAWS.

Michigan Supreme Court Declares Law Requiring 50 Cents a Horsepower Is Unconstitutional—No Hope for Uniform Statute—Motor Truck Ordinance Dead.

MARCH 26 the supreme court of Michigan handed down an opinion declaring the motoring law passed by the legislature of that state during its session of 1913 is unconstitutional, because "the title of the law was not sufficiently broad to cover the body of the bill" and "it was a license title on a tax law". The decision will prove of interest to motorists in practically every state, as having an important bearing upon the subject of double taxation.

The Michigan law was patterned somewhat after the statute in force in Connecticut, although it went a trifle further than in that commonwealth. The Connecticut law was enacted in 1911, and fixed the license fee for all other motor vehicles than motorcycles, commercial cars, cars operated by hire by liverymen and cars in the hands of manufacturers or dealers, at 50 cents a horsepower. In Michigan the fees for the registration of all motorcycles, motor trucks and automobiles, except those in the hands of manufacturers or dealers, were set at 50 cents a horsepower. The Michigan law expressly stated that these fees should be in lieu of all other forms of taxation, but this does not appear to have been sufficient to save the statute.

According to the secretary of state, approximately \$226,000 had been collected under this law, since it went into effect Jan. 1. This sum must be returned to the automobile owners, with the exception of \$3 for each machine, which was the annual registration fee provided under the old law, passed in 1909.

APPOINTED AS DEPUTIES.

Los Angeles Automobile Dealers to Give Police Department Substantial Aid.

Thirty-two members of the Motor Car Dealers' Association of Los Angeles, Cal., will be appointed special policemen to deal with violations of the speed ordinance, according to present indications. Request for their appointment already has been made to the police department, and is said to have met with the approval of the commissioner. These deputies are to serve without pay and will pledge themselves to take the time to go into court and prosecute a driver

when an arrest has been made.

The plan is said to have originated with Capt. H. D. Ryus of the Oldsmobile Company of Los Angeles, president of the association. He takes the position that reckless driving must cease for the good of the industry, and that existing laws are sufficient for the purpose if properly enforced.

NO UNIFORM LAW.

State Legislatures Refuse to Consider Bill Prepared by Joint Commission.

All hope for a uniform motoring law appears to have been dissipated as the result of the position taken by state legislatures to which the bill prepared by a joint commission, held to represent several of the eastern states, was reported by this commission. In each instance, where this bill has been presented, the legislative committee has declined to consider the bill, on the ground that it did not represent the work of a commission appointed with authority from the states which they purported to represent. Other legislatures will meet next year, so that there is some slight hope that public opinion may be aroused to the point where action will be deemed advisable.

The bill, which was regarded as a desirable working basis, at least, was prepared after much time and thought on the part of the following men: Secretary of State Albert Phillips, Highway Commissioner Charles J. Bennet and Alfred H. Terry of Connecticut; Judge Sylvester Townsend and Charles H. Guyer of Delaware; Attorney-General Scott Wilson, Lyman H. Nelson and J. G. Scates of Maine; Chairman William D. Sohler of the state highway commission of Massachusetts; Highway Commissioner Harry Roe. President H. M. Rowe and Secretary H. M. Luzzius of the Automobile Club of Maryland, representing Maryland; Samuel W. Taylor, Fay C. Parsons and A. J. Deer of New York; Motor Vehicle Commissioner Job H. Lippincott, Highway Commissioner Edwin A. Stevens and George L. Burton of New Jersey; Highway Commissioner E. M. Bigelow and Robert P. Hooper, the latter representing the Pennsylvania Motor Federation of Pennsylvania.

The standing of these men is such as to merit every consideration, but it would appear that this phase of the situation was given little or no thought by those who declined to accept the result of their endeavors to be of service to the public.

TRUCK ORDINANCE DEAD.

Corporation Counsel Informs New York City's Aldermen That Plan Is Illegal.

Some months ago the text of a proposed ordinance taxing motor trucks, introduced in the board of aldermen, New York City, by Alderman McAnney, was printed in full in these columns. It was one of the most drastic measures ever suggested in this country, and its passage would have worked great hardship upon commercial vehicle owners and users, to say nothing of its effect upon the industry itself.

Before taking action on the bill, it was referred to Corporation Counsel Polk, for an opinion as to its legality. That opinion has been filed, and sets forth in effect that, while the board undoubtedly has the power to regulate the use of city streets, it has no power to fix a direct tax for revenue purposes. He adds that he feels compelled to advise the board that it cannot legally enact the ordinance as drawn.

Motor truck owners and users, particularly members of the Motor Truck Club, feel convinced that no further attempt will be made to regulate the weight of vehicles in the manner suggested.

MANY MOTOR CAR BILLS.

More Than 160 Relating to Vehicles and Highways Introduced in Legislatures.

In the first 10 weeks following the opening of the legislatures in January, more than 160 bills relating to or directly affecting motor vehicles and highways were introduced. The bills were diversified, some creating highway commissions, requiring lights at night on all vehicles, authorizing the placing of warning signs at dangerous turns and hills, etc. Others are not viewed with favor by owners and the industry as a whole.

In the last named class is mentioned a New Jersey bill which would compel shading or hooding the headlights so that the rays would not be cast at a greater elevation than five feet from the ground. Rhode Island has a bill in contemplation which specifically forbids the operation of any vehicle "to which there are lights attached

of such candlepower as will throw rays 200 feet ahead".

The obvious purpose of a large proportion of the bills is to produce funds which can be applied to road maintenance and construction. By putting a proportionate tax on horse drawn vehicles, it is estimated that the yearly vehicle license fund for road work would be doubled.

WILL TEST VALIDITY OF LAW.

Wisconsin Motorists to Fight Registration and Owners' Fee, Claiming Double Taxation.

The motor clubs of Wisconsin have combined to test the validity of the law requiring the registration of motor cars and the payment of a \$5 fee by private owners at the beginning of each year. This is the result of the recent successful action against annual registration fees in Ohio. Milwaukee motorists claim that they are subjected to double taxation, as the state collects a license fee and also a personal property tax on automobiles. As the personal property tax is higher than the annual license fee in a great majority of cases, it is suggested in some quarters to compromise the situation by making the license fee receipt an offset on the personal property tax payment. In the payment of the income tax in Wisconsin the personal property tax receipt is an offset.

The motor registry fees in Wisconsin are as follows: Private owners, \$5; dealers, \$10; motorcyclists, \$2; transfer of license from one car to another during one year, 50 cents. The net proceeds now go into the state highway fund.

MUST PAY BACK FEE.

Secretary of State in Iowa Holds That Purchaser of Second Hand Car Is Responsible.

According to a report from Des Moines, Ia., the secretary of state has made a ruling that a person buying a second hand car must see to it that the registration fee for the previous year has been paid. It was also ruled that the Iowa registration fee for motor cars is a police measure, not taxation.

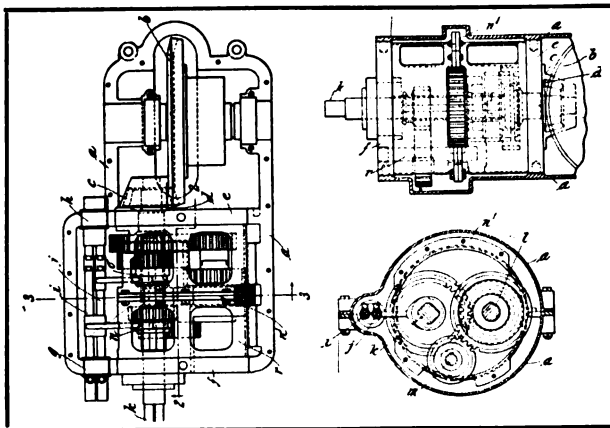
The decision was made in the case of a man who purchased a 1913 car recently, and for which the previous owner had not paid the 1913 fee. It is stated that the case will be threshed out in court. The reason advanced by the secretary for the ruling is that the fee is the same for a \$600 or a \$7000 car.

THE FARR TRANSMISSION GEARSET.

A PATENT has been granted to Herman G. Farr, a mechanical engineer of Springfield, Mass., who has assigned this to the Knox Automobile Company, which covers the construction of a motor vehicle power transmission gearset, designed for use with machines built for freight service. The gearset is a conventional type with sliding gears that may be selected at will so as to afford any desired speed ratio, but as designed it is intended for incorporation with a differential casing such as is constructed for the jackshaft of the chain driven machine, and assumedly is not combined with rear axles of the floating construction.

Components of Gearset.

The gearset and differential casing are divided longitudinally, the lower section carrying the gearset and the differential gearing, the upper



The Farr Transmission and Gearset: At Left, Plan View, Showing Combination with Differential; at Right, Top, Longitudinal Section at the Figures 2-2; Bottom, Transverse Section at the Figures 3-3.

portion being practically a cover. The gearset itself is built with the main shaft and the countershaft paralleling at the same height, with the reverse stud shaft carried below, the main shaft carrying the movable gears, which are coupled by dog clutches. The gearset does not differ in the constructional details from the conventional type up to this point, but instead of the bearings carrying the shafts being mounted in the end walls of the casing the case carries a frame in which the entire gearset, including the pinion shaft, is mounted. This frame or cage is in two parts and is bolted together at a point near the centre, the frame members being substantial in construction and designed to endure under heavy stresses.

The ends or head members of the frame are

fitted accurately into the casing, so that the gearset as an assembly is rigidly supported, and these are retained in the case by substantial studs that are inserted externally through the case. When assembled the frame is practically a part of the case, but by the removal of the cover of the case and the retaining bolts the frame with the shafts, bearings, gears and pinions may be removed from the casing. The value of the construction is that with comparatively little labor the gearset may be taken from the case for examination, and it may be placed on a bench practically operable, when it can be tested, and if repair is necessary it can be assembled and tried before being placed in the casing.

Saves Time and Labor.

The removal of the gearset as an assembly is known to be a decided saving in labor, as well as an insurance that it is operative, while all parts can be worked on with much greater ease and rapidity while on a bench than in the vehicle. The clearing of the case of the gearset also makes practical and easier the work that may be necessary with the differential, so that this need not be removed save for repair, as adjustment can be easily made, and the casing can be completely cleaned without much labor and with assurance that the gearset will be in perfect condition when restored to the case. The removal of the cover section of the case affords the same access that is had with the ordinary construction, and should there be need the gearset may be taken out with comparative ease.

In the drawings reproduced, a is the gearset and differential case, b the differential, c the extension of the rear head to support the main shaft bearing, d the bevel gear of the jackshaft, e and f the head members of the gearset frame, g and h the supporting members for the gear shifting rods, i and j the gear shifting rods, k the main shaft, l the countershaft, m the reverse stud shaft, n and o the gear clutches, n' the frame or cage connection flanges, and r the frame or cage. The accompanying illustration of the gearset is very comprehensive, as it gives the detail of construction clearly. The top or plan view is of the gearset assembled in the case and as a unit with the differential gearing, for the removal of the cover exposes every part of the assembly, and the end or frame members that contain the gearset can be noted as supplying the conventional solid ends of the casing.

Aside from this sectional design the case conforms to ordinary construction. Turning to the

upper right sketch in the illustration it will be noted that this is a vertical longitudinal section, at the points designated at 2—2 in the plan view, and this indicates the end members and the stud bolts retaining them, as well as the flanges of the frame, which are bolted together directly over and under the gear, the flanges forming a web that materially stiffens the frame when assembled.

It will be seen that the end members are heavily constructed and intended to endure hard service. The lower right sketch is a transverse section at the flanges of the frame, at the point indicated in the plan view as 3—3, this indicating the relative positions of the shafts and gears.

MOTZ TIRES PROMINENT.

Were Largely in Evidence on Electrics at Motor Car Shows.

According to figures compiled by the Motz Tire & Rubber Company, Akron, O., maker of the Motz cushion tire, its product was largely in evidence at the shows. With the close of the Boston exhibit it was figured that at the six leading shows 70 of the 134 electric cars exhibited were equipped with the Motz tire.

TO PLACE SIGNBOARDS.

Wyoming Automobile Association to Mark Roads Throughout That State.

A movement is on foot to mark the automobile roads throughout Wyoming by the Sheridan Motor Club. Dr. Stahl, a member, while visiting Colorado, was greatly impressed with the signboards put up in that state by the Denver Motor Club, and intends to call upon the county commissioners and the Wyoming State Highway Association for assistance in the matter.

WILL MANAGE ELGIN RACES.

Chicago Automobile Club Signs Agreement to Promote the Annual Road Race.

An agreement has been signed between the Chicago Automobile Club and the Elgin Automobile Road Race Association whereby the former will again promote the annual Elgin road race. The dates have been changed from those assigned by the contest board of American Automobile Association: Instead of being Aug. 28-29, they will be Aug. 21-22, the change being made to avoid a conflict with the Pomona speed-

way race, which has been assigned to Sept. 9.

The Elgin programme has been altered, the small car event having been abandoned and the Chicago Automobile Club trophy event will be for cars of 450 cubic inches and under, instead of 300 and under. The Elgin National trophy race will be a free-for-all instead of for cars of 400 cubic inches and under.

W. O. RUTHERFORD PROMOTED.

Is Elected Assistant General Sales Manager of the B. F. Goodrich Company.

W. O. Rutherford, well known in the tire industry, has been made assistant general sales manager of the B. F. Goodrich Company in recognition of his ability in meeting and handling critical situations in the selling field. The change carries with it official recognition of the duties which have been performed by Mr. Rutherford during the past four years as assistant to H. E. Raymond, second vice president and general sales manager. Mr. Rutherford has displayed ability in organization of sales forces and the announcement of his promotion will be noted with pleasure by his hosts of friends in the automobile industry.



W. O. Rutherford, Assistant General Sales Manager of the B. F. Goodrich Company.

He first demonstrated his qualifications as a sales manager at the Denver branch of the B. F. Goodrich Company, and was for 10 years at the head of the Buffalo, N. Y., organization. During the past four years he has made his headquarters at Akron, O. Mr. Rutherford takes his promotion modestly and attributes it to a close application to the many details of the industry.

NEWS OF THE MANUFACTURER AND DEALER.

The following concerns have been incorporated recently to manufacture and deal in motor cars, accessories, etc.:

Girton Hoffer Company, Los Angeles, Cal.; to deal in motorcycles.

Electric Auto Association, Youngstown, O.; \$24,000.

G. & Z. Garage Company, New York City; \$20,000; to operate a garage; S. S. Zula, B. Gorschalki, L. E. Swartz.

Fiat Motor Company, Chicago, Ill.; \$2000.

Broad Street Garage & Sales Company, Palmyra, N. J.; to deal in automobile supplies.

George W. Canterbury Company, Boston, Mass.; \$50,000; to deal in motor cars; George W. Canterbury, Henry G. Lapham, Samuel D. Pope.

Ashland Motor Livery, Chicago, Ill.; to deal in automobiles.

Burgh Taxi Cab & Garage Company, Chicago, Ill.; \$1000; to operate a garage.

Atlantic States Sales Company, Philadelphia, Penn.; \$25,000; to manufacture and sell automobiles and accessories.

Laredo Auto Sales Company, Laredo, Tex.; \$12,500; J. R. Moore, W. J. Sames, J. E. Applewhite.

South Butte Auto Company, Butte, Mont.; to conduct an automobile and accessory house.

Middle States Motor Company, New York City; \$5000; A. C. Beck, C. F. Marion, D. D. Kaess.

Bacon-Wain Motor Sales Company, Toledo, O.; to conduct a general automobile business.

Ocean Shore Auto Storage Company, San Francisco, Cal.; \$25,000.

Atlas Tire Association, Augusta, Me.; \$10,000; E. M. Leavitt, E. L. McLean.

Wilson's Ford Specialty Corporation, Buffalo, N. Y.; \$12,000; to deal in automobile accessories; K. R. Wilson, C. F. Schultze, A. C. McCall.

Respiro Motor Company, Memphis, Tenn.; \$25,000; to deal in automobiles; C. M. Hammonds, W. G. Cavett, T. E. Acklen, T. Irvin, R. Troutt.

Wisconsin Oil & Supply Company, Milwaukee, Wis.; \$7500; to deal in lubricants, fuels, etc.; H. H. Gerlach, P. J. Klumb, C. Weckmueller.

Eagle Chemical Company, Milwaukee, Wis.; \$25,000; to manufacture and deal in chemicals; E. D. Fowle, W. E. Jones, R. E. Winibigler.

Mason Bros., New York City; \$10,000; E. J. Ellenwood, S. H. Mason, C. S. Mason.

Washington Heights Taxicab Company, New York City; \$1000; R. E. Topping, M. L. Topping, G. Kirwin.

Wood Motors Company, New York City; \$2000; J. E. Wood, Jr., F. McKenna, H. R. Partridge.

American Road Appliance Company, Ocean City, N. J.; \$500,000; to manufacture motor car road sweeping machines; H. Pezzetti, B. T. Moore, D. de Benedictis.

Ahlberg Kerosene Carburetor Company, Pittsburg, Penn.; \$300,000; Harry Davis, P. W. Burke, N. J. Dain.

Beechwood Garage, Rochester, N. Y.; to conduct a garage; E. E. Russell, W. Hiller.

Pacific Cyclecar Company, Seattle, Wash.; \$40,000; F. W. Bishop, T. F. Murphine, T. Anderson.

A. L. Robertson Motor Supply Company, New York City; \$32,000; to conduct a motor car business; G. E. Smith, A. Keogh, W. W. Hoffman.

Whitfield Starter Corporation, \$12,000; to manufacture starters; T. M. Day, G. E. Foley, L. F. Mentz.

The End-Oxy Appliance Company, Trenton, N. J.; \$50,000; Earl H. Endebruck, Frederick H. Endebruck, Robert J. Erlichman.

New Orleans Cyclecar Company, New Orleans, La.; \$17,500; to manufacture motor driven vehicles; Julius C. Werner, Isaac T. Rhea, William S. Campbell.

David Acetylene Gas Generator Company, New York City; \$10,000; Louis Strinban, Dave Strinban, Henry Melzer.

The Whyer's Automobile Company, Stockton, Cal.; \$10,000; to conduct a general automobile business; F. B. Alida, Raymond F. Whyers, L. D. Myers.

Eagle Auto Transfer Company, Chicago, Ill.; \$15,000; garage transfer and delivery business; Samuel A. Miller, Elizabeth Gradley.

American Electric Car Company, Portland, Me.; \$1,500,000; to manufacture and deal in automobiles and parts; F. A. Brand, T. Huss and others.

The Consumer's Auto Supply Company, Youngstown, O.; \$10,000; to conduct a garage and automobile business; Charles B. Jackson, Max M. Reese, Clate L. Baldwin, A. V. Hinman, R. E. Robinson.

Kokomo Welding Company, Kokomo, Ind.; \$1000; J. M. Klein, Rude Brown, W. A. Ulrich.

Singer Motor Company, New York City; \$200,000; to manufacture automobiles; Charles A. Singer, Sr., Charles A. Singer, Jr., Harold Callisen.

Central Screw Company, Chicago, Ill.; \$25,000; to manufacture and deal in valves; H. F. Kellogg, O. M. Dennis, F. M. Kingsley.

Irwin Automatic Signal Company, St. Louis, Mo.; \$50,000; to manufacture automatic signals; Charles F. Smith, John J. Dillon, William G. Berg.

Waterbury Tire Company, Waterbury, Conn.; \$2500; George J. Richards, James Powers, Frank Hayes.

City Auto Repair Company, Hartford, Conn.; to operate a garage.

Giant Tire & Rubber Company, Lincoln, Neb.; \$20,000; to engage in the automobile tire business; J. E. Fitzgerald, J. C. Root, R. W. Parker, John T. Yates, R. W. Morrison.

Distillate Motor Equipment Company, San Francisco, Cal.; \$100,000; to deal in motor parts; H. M. McDonald, W. W. McDonald, G. S. Bartlett, A. R. Larn, W. Barnes.

GARAGE AND DEALER.

Horn & Willis, Ennis, Tex., has purchased the Interstate Garage and will operate it under the name of the Ford Garage.

Wilmarlin Wallace, Blairstown, N. J., will open a new modern garage.

J. Van Benschoten, Poughkeepsie, N. Y., is having extensive improvements made to his garage.

Miller & Dietrich Auto Exchange Company, Point Marion, Penn., is to erect a large and modern garage and machine shop. Up-to-date machinery will be installed.

The Capital Garage & Engineering Company, Carson, Nev., has opened a garage and repair shop. It is modern throughout.

Louis M. Stever, Richmond Hill, N. Y., has been appointed general representative in the United States for the Gas-O-Meter Maximall, which is manufactured in Germany.

The Stanley & Fenton Company, Clinton, Ia., has opened its new and modern garage. The company handles the Auburn cars.

Matrud & Thompson, Hatton, N. D., has opened a tire vulcanizing plant in the Stevens building. The company also conducts a general repair business.

The Motor Inn Company, Albert Lea, Minn., has purchased a lot with 26 feet frontage on Broadway upon which an addition will be made to its large building.

J. P. Marks, Le Sueur, Minn., has purchased W. H. Rethwill's garage.

The Slayton Auto Company, Slayton, Minn., is making extensive improvements to its garage.

The Shafer-Decker Company, Rochester, N. Y., has been forced to move to larger quarters at 15 Circle street. The garage is open day and night.

Knass & Schermerhorn, Grand Rapids, Mich., has purchased the Wealthy Heights Garage. Edward J. Strong, the former owner, has retired from the business.

C. A. Kroehne, Springfield, Mass., has purchased a garage at 57 Pecowsic avenue, where he will handle Gray & Davis products. He will also specialize in the repair of this equipment and the Bosch magneto.

W. P. Gribble, Houston, Tex., has disposed of his interest in the Houston Motor Car Exchange. He will handle the Partin-Palmer cars and has opened a salesroom for that purpose.

Smith & Morrison, El Centro, Cal., has purchased the Central Garage.

The Borough Garage, Plainfield, N. J., has been purchased by H. J. Scandell and C. M. Haight. G. M. Romond will be the manager.

Henry H. Hyder, Riverside, Cal., is to open a new and modern garage at 446 West Eighth street. He will secure a car agency in the near future.

Brink & Payne is a new firm at Grand Rapids, Mich., which will engage in the automobile trimming business. The company will be located at 14 Island street.

The Haynes Automobile Company, Kokomo, Ind., has arranged with H. T. Sheffield, Calgary, Alb., to handle the company's cars in that territory. Mr. Sheffield is a well known automobile dealer.

D. C. Cain, Columbus, O., who is the agent for Ford cars, has added an electric charging plant to his taxi and repair service.

The Fisk Rubber Company, Los Angeles, Cal., is now located in its new home at 10th and Hope streets.

Edgar Updyke, Indianapolis, Ind., has moved to more commodious quarters at 343 North Capitol avenue. He is agent for the American car.

Martin Swintek, Eddyville, Ia., is erecting an up-to-date garage on North First street. A general storage and repair business is to be conducted.

Louis Peterson, Hartley, Ia., has purchased the Startling-Steece garage, and will combine with A. F. Palmquist, who is agent for Ford cars, in making it one of the largest establishments of this nature in the city.

The Litchfield Auto Company, Litchfield, Minn., has installed an electric drill in its large garage.

Virgil Collins, Ashley, N. D., is building a garage, where he will conduct a repair shop and storage business.

The Rochester Tire & Repair Company, Rochester, Minn., has opened a new vulcanizing plant at 18-20 East

ment being especially packed for the long journey.

The Maryland Electric Vehicle Manufacturing Company, Baltimore, Md., has been incorporated to manufacture the Maryland electric commercial car. The company has opened its factory and will make a feature of 1000-pound vehicles to sell for \$1250. The company will also make cars up to 10,000 pounds. William Knoblock is manager.

The Hartford Auto Parts Company, Hartford, Conn., has contracted to supply the American Cyclecar Company, Bridgeport, Conn., with \$200,000 worth of parts for its cyclecar. Transmissions will constitute the main part of the order.

The Northern Engineering Works, Detroit, has undertaken the manufacture and sale of the Thurber rotary starter, and the business of the Thurber Rotary Starter Company will be handled by it through its Thurber rotary starter department.

The Universal Tire Company, Los Angeles, Cal., has purchased the Dryfus Winery at Anaheim, Cal., for the purpose of establishing an automobile tire factory.

The Mansfield Tire & Rubber Company, Mansfield, O., has completed its three-story addition and it will soon be ready for occupancy.

The Briggs Manufacturing Company, Detroit, which manufactures automobile bodies, has acquired the large plant formerly occupied by the A. C. Knapp Trimming Company. It is three stories high and is 200 by 210 feet.

The Crown Motor Company, New Albany, Ind., has



A Corner in the Shipping Department of the No. 3 Studebaker Plant, Detroit, Showing Crew of Men Boxing the Automobiles for Export.

Fifth street. E. J. & A. J. Kos is to manage the affairs of the company and will stock Federal and Pennsylvania tires.

The George W. Bolton Company, Detroit, has purchased the business of the Colonial Tire Repair Company of that city.

C. A. Chambers, Indianapolis, has taken over the business of the Krit Motor Car Company. He is also agent for the Federal trucks and is located at 334 North Delaware street.

Yawkey & Mats, South Bend, Ind., has opened an automobile accessory store.

S. A. Woldrick, Sleepy Eye, Minn., has purchased three lots on Main and Fourth streets on which he intends to erect a garage.

WITH THE MANUFACTURERS.

The Studebaker Corporation, Detroit, during the month of February exported daily more than 40 Studebaker cars to its distributors in Great Britain, Europe, Australia, Singapore, South Africa and the Far East. An accompanying illustration shows a corner of shipping department in No. 3 plant of the Studebaker Corporation, Detroit. To facilitate handling, each car is placed in a crate, its wheels, top, windshield and general equip-

ment being especially packed for the long journey. purchased from Ferdinand Kahler the automobile factory on Vincennes street formerly occupied by the Ohio Falls Motor Car Company. The price paid was \$50,000. A representative of the company states that the concern will employ 600 men and that 10,000 machines will be manufactured between now and Sept. 1.

The Amplex Manufacturing Company, Mishawaka, Ind., will produce a medium priced six-cylinder car designed by E. J. Gulick, who was the former engineer of the Simplex Company. The designing and general management will be in charge of Mr. Gulick, while the management of the plant will be in the hands of Mr. Randall.

The Springfield Spring Company, Springfield, O., has taken over the former plant of the Owen Machine Company. The building will be remodelled into a plant for the manufacture of all kinds of springs. The company has increased its capital from \$35,000 to \$60,000.

The Canadian Products, Ltd., Guelph, Ont., has purchased the plant of the Standard Fitting & Valve Company. The president of the new company is W. B. Hinman. The concern will manufacture high carbon steel structural tubing.

The Walker Starter Company, Laporte, Ind., has purchased the property in which it has been operating, which includes two lots and buildings on Monroe street. The company manufactures starters for automobiles, traction engines and stationary engines.

CRITICISM OF SAFETY FENDERS.

AN INJURY or fatality resultant from a motor vehicle striking a person in its path immediately causes the assumption by a very large proportion of the public that protection should be afforded by equipment carried by machines. The thought is perhaps logical, but how this condition can be met is a subject that has received a great deal of attention by those who have the welfare of the public, the motor vehicle industry, and the owners of the machines to consider.

The first municipality to enact an ordinance requiring fender equipment was Detroit, which has recently repealed this measure, and this was followed by a similar ordinance enacted in Chicago. Later on an ordinance offered in the Cleveland, O., city council was not favorably reported by the committee to which it was referred, and the Milwaukee, Wis., city council rejected an ordinance having practically the same purpose.

The experience with the ordinances of Detroit and Chicago has been followed very carefully by the industry and its various organizations, as well as the industrial and trade press, with a view of ascertaining the results from the practical utilization of such fenders as have been developed. Broadly, it may be stated that no satisfactory fender has yet been conceived.

The possibilities from agitation of fender equipment has impelled the National Automobile Chamber of Commerce to learn from service vehicle manufacturers and users in Detroit and Chicago the effects of the ordinances, and the opinions as to the practicability of fenders as applied to machines in those cities. No one of more than 20 responses to inquiries has been favorable to the use of fenders, and practically all point out the inefficiency of those that have been tried, as well as the possibility of increase of accidents through their use.

In Detroit the ordinance became effective Oct. 1, but upon representations made by motor car owners the time was extended to Nov. 1 by the police commissioner, because he could not approve any fender submitted, and later was extended to Jan. 1 by the same official. After that time endeavor was made to enforce it, but it caused such hardship for motor vehicle owners because of the impossibility of obtaining a satisfactory fender, that in March the ordinance was repealed. The experience of the police commissioner was that there was no apparent diminution of accidents because of the use of fenders.

Those who have observed conditions and studied the subject of fenders are very generally united in criticism, which may be summarized as follows:

That such fenders as are now available are as likely to cause injury or fatality as to prevent, that they increase traffic confusion, that they are easily damaged and made inoperative, that no satisfactory or effective type of fender is known.

In connection with this an analysis of the records of street accidents in Cook county, made by the coroner of Chicago, is of interest, from the fact that it was established that motor vehicles have caused about half the number of deaths resultant from horse vehicle accidents when the miles travelled is taken as a basis.

The Pierce-Arrow Motor Car Company has published a pamphlet dealing with the subject, in which are summarized arguments for and against the use of fenders, prepared by its engineering department, and this is being distributed to those who are desirous of learning the facts, in which it is stated that a fender that would save life, provided it was made in a manner and of material that would endure, could be easily applied and kept in good repair, would be welcomed by all. Such a fender would be adopted, but legislation compelling the adoption of any unproven device that might be offered for the purpose is deprecated. The report of the public service commission for the first district of New York State, which was published Dec. 29, 1908, on car fenders and wheel guard tests, is referred to. This report can be purchased at 150 Nassau street, New York City. The report deals with tests made with life size dummies, very carefully made to represent actual conditions, with the comment that these trials were with street cars over a fairly good bed in a fixed direction. The comment is made that the gist of this report is that very careful and elaborate tests should be made before deciding on a fender, and that many fenders which would seem to be valuable were more dangerous than if not used.

EQUIPPING THE GARAGE.

The purchaser of a new machine who intends to attend personally to its upkeep, will find many valuable suggestions dealing with the selection of the garage equipment in the annual overhaul and equipment number of The Automobile Journal of April 25.

RECENT PATENTS.

Mounting for Headlights, William E. Nickerson, Cambridge, Mass., assignor to Everett D. Chadwick, trustee, Winchester, Mass.; No. 1,089,430. Filed June 16, 1911.

Motor, Olof Ohlsson Sodartelje, Sweden; No. 1,089,432. Filed May 22, 1907.

Wheel, Birt B. Stepleton, Downing, Mo., assignor of one-half to E. J. Goines, Memphis, Mo.; No. 1,089,445. Filed Nov. 25, 1912.

Jump Spark Ignition Apparatus, Mark B. Crist, Pittsburg, Penn., assignor, by mesne assignments, to Capitol Trust Company, trustee, same city; No. 1,089,461. Filed Feb. 15, 1906.

Motor, Mark B. Crist, Pittsburg, Penn., assignor by mesne assignments, to Capitol Trust Company, trustee, same city; No. 1,089,462. Filed April 20, 1910.

Rotary Engine, Lafayette Holt, Burlington, N. C.; No. 1,089,469. Filed May 28, 1912.

Carburetor, Howard B. Hunt and William S. Peloubet, Los Angeles, Cal., assignors to Hunt Gas Machine Company, Minneapolis, Minn.; No. 1,089,471. Filed Feb. 14, 1913.

Motor, Alexander T. Kasley, Swissvale, Penn., assignor, by mesne assignments, to Capitol Trust Company, trustee, Pittsburg, Penn.; No. 1,089,478. Filed Sept. 1, 1909.

Sectional Resilient Tire, Charles A. Marlen, St. Louis, Mo.; No. 1,089,489. Filed March 9, 1912.

Carburetor, John Ruthven, Indianapolis, Ind.; No. 1,089,501. Filed Aug. 30, 1912.

Wheel, Alfred J. Swing, Cincinnati, O.; No. 1,089,511. Filed Feb. 26, 1913.

Carburetor, Walter C. Westaway, Belvidere, Ill., assignor to William W. Lufkin, Beloit, Ill.; No. 1,089,516. Filed June 12, 1911.

Carburetor, Herbert Raymond Barrett, Southport, and Kenneth McClymont Wilson, Manchester, England, assignors to Phoenix Motor Company, Altrincham, England; No. 1,089,524. Filed Nov. 6, 1911.

Valve Gearing, Harry W. Bolens, Port Washington, Wis.; No. 1,089,526. Filed June 28, 1912.

Storage Battery System, Edward A. Halbleib, Rochester, N. Y., assignor to North East Electric Company, same city; No. 1,089,549. Filed Jan. 16, 1913.

Automobile Lock, Herman J. Neumann, Los Angeles, Cal.; No. 1,089,581. Filed Oct. 5, 1912.

Pneumatic Suspension Device, John Williamson, Brooklyn, N. Y., assignor of one-third to Harvey E. Randall, and one-third to Albert P. Stewart, same city; No. 1,089,610. Filed Dec. 28, 1911.

Valve, Harry E. Bailey and Clyde Parsons, Green Castle, Mo.; No. 1,089,620. Filed March 24, 1913.

Wheel Rim, Richard F. Gelde, Rochester, N. Y.; No. 1,089,624. Filed Nov. 21, 1913.

Motorcycle Steering Mechanism, David James Johnston, Toronto, Ont., assignor to Militaire Auto Company, Inc., Cleveland, O.; No. 1,089,647. Filed Jan. 29, 1913.

Ratchet Wrench, Gordon K. Wright, Hinsdale, Ill., assignor to Chicago Manufacturing & Distributing Company; No. 1,089,737. Filed March 19, 1913.

Reflecting Lamp, Harry A. Douglas, Chicago, Ill.; No. 1,089,750. Filed Aug. 5, 1912.

Motor, James M. Morgan, Royal, Ia.; No. 1,089,779. Filed May 4, 1912.

Mixer for Gaseous Fuel, Herman E. Whiting, Palmyra, N. Y., assignor to Garlock Auto Specialty Company, same city; No. 1,089,804. Filed Feb. 15, 1911.

Piston, Charles Day and George E. Windeler, Stockport, England, assignors to General Electric Company; No. 1,089,823. Filed June 13, 1912.

Shock Absorber, Wiley R. Frommater, Long Island City, N. Y.; No. 1,089,830. Filed Nov. 14, 1913.

Ball Bearing Retainer, Gustav H. Stahl, Chicago, Ill.; No. 1,089,877. Filed April 24, 1913.

Gas Turbine, Heinrich Zoelly, Zurich, Switzerland; No. 1,089,892. Filed Jan. 6, 1913.

Sectional Cushion Tire, James H. Bedell and Isaac E. Bedell, Stamford, Conn.; No. 1,089,897. Filed Sept. 19, 1912.

Pneumatic Tire, Jerome J. Dittenhoefer, Chicago, Ill.; No. 1,089,913. Filed Sept. 2, 1913.

Motor Starter, Henry S. Rauch, Jackson, Mich.; No. 1,089,962. Filed Feb. 2, 1912.

Pneumatic Support and Shock Absorber, S. Walter Scott, Troy, N. Y.; No. 1,089,974. Filed July 17, 1912.

Spring Wheel, Frederick Stitzel, Louisville, Ky.; No. 1,089,979. Filed Jan. 15, 1913.

Valve Mechanism, Ural Stiwell Traub, Yonkers, N. Y.; No. 1,089,989. Filed March 13, 1912.

Air Supply Means for Motor, William A. Watkins, Riverside, Cal., assignor of one-half to Sidney A. Ratliff, same city; No. 1,089,998. Filed June 20, 1913.

Radiator, Adelard J. Carriere, Putnam, Conn.; No. 1,090,023. Filed Feb. 1, 1913.

Self-Propelled Power Machine, Arthur S. Clemons, Bartlett, N. H.; No. 1,090,027. Filed Oct. 26, 1912.

Carburetor, Maurice Goudard and Marcel Mennesson, Levallois-Perret, France; No. 1,090,047. Filed Nov. 26, 1912.

Resilient Wheel, George Hunter Robinson, Bayswater, London, England; No. 1,090,087. Filed June 16, 1913.

Motor Starter, Frederick Richard Simms, London, England; No. 1,090,109. Filed July 14, 1913.

Rim, Benajah Bradford, Norristown, Penn., assignor to Lee Tire & Rubber Company, Conshohocken, Penn.; No. 1,090,114. Filed March 29, 1910.

COMING EVENTS.

April.

April 9-15—Show, Manchester, N. H.

April 12—Show, Palermo, Italy.

April 12-19—Show, Vienna, Austria.

April 13—Race meet, Brooklands track, Weybridge, England.

April 21—S. A. E. research division meeting, New York City.

April 22—Track races, Bakersfield, Cal.

May.

May 5—S. A. E. electrical equipment division meeting, New York City.

May 12—S. A. E. ball bearing division meeting, New York City.

May 14—S. A. E. motor testing division meeting, New York City.

May 25-26—Targa Florio race, Italy.

May 30—500-mile race, Indianapolis, Ind.

May 30—Track meet, New York City.

May 30—Track races, Providence, R. I.

June.

June 1—Coupe Florio race, Palermo, Italy.

June 6-7—Track meet, St. Louis, Mo.

June 9-11—Isle of Man road race.

June 17-18—Hill climb, Uniontown, Penn.

June 23-26—S. A. E. midsummer meeting, Cape May, N. J.

June 24-26—Meeting National Gas Engine Association, Chicago, Ill.

June 27—Race meet, Brooklands track, Weybridge, England.

June 30—Track races, Sioux City, Ia.

July.

July 3-4—Road races, Tacoma, Wash.

July 4—Track races, Providence, R. I.

July 4—300-mile race, Sioux City, Ia.

July 4—Grand Prix, Lyons, France.

July 17-18—Speedway meet, Seattle, Wash.

July 25-26—Grand Prix, Belgium.

August.

Aug. 21-22—Road races, Elgin, Ill.

Aug. 27—Race meet, Brooklands track, Weybridge, England.

September.

Sept. 5—Track races, Milwaukee, Wis.

Sept. 7—Track races, Providence, R. I.

Sept. 9—Speedway races, Pomona, Cal.

Sept. 9—Road races, Corona, Cal.

Sept. 9—Grand Prix, Italy.

Sept. 26—Race meet, Brooklands track, Weybridge, England.

Sept. 26-Oct. 6—Show, Berlin, Germany.

October.

Oct. 1—Kerosene motor competition, Paris, France.

Oct. 2-3—Track meet, Oklahoma City, Okla.

Oct. 2-3—Track meet, Trenton, N. J.

Oct. 16-26—Automobile Salon, Paris.

Oct. 19-26—American road congress, Atlanta, Ga.

November.

Nov. 6-16—Olympia show, London.

Nov. 8-11—Track meet, Shreveport, La.

CONDITIONS NOW NORMAL.

Excitement Over Ford Profit Sharing Plan Dies Away—Effect on Employees Noted.

Conditions in the vicinity of the Ford Motor Company's plant at Detroit have assumed their normal aspect. No longer thousands of men besiege the entrances on Manchester avenue in the hope of securing positions under the new wage regime. They have come to realize the futility of their campaign.

The painstaking manner in which the new wage scale was evolved and the thorough way in which the entire plan is being fortified by elaborate follow-up work is illustrated by several features. One of the most significant relates to the handling of employees in the shops to discover by a thorough test their fitness for work in the various departments and thus to protect them against a seeming failure to make good and a summary dismissal.

Foremen are not allowed to dismiss a man arbitrarily. If the head of the department finds a man is not doing satisfactory work, instead of dismissing him outright, he must send him to a clearing house, where his case is investigated and he is given another trial in some other department, unless he is found to be wholly inefficient. There his ability for another kind of work will be tested. These shifts may take place a half a dozen times before the man is dismissed.

The company is determined that the additional money received shall be devoted to reasonable purposes. In order to decide this a large number of investigators have been selected from the factory. They study the employees and ascertain how the money is utilized. If it be found that any employee is not profiting as he should by the additional money, he must prove that he can, or he no longer participates in the profit sharing plan.

"TIRE OBSERVATION".

Goodyear Tire & Rubber Company Issuing Series of Bulletins Dealing with Tires.

The Goodyear Tire & Rubber Company, the factory of which reached the production mark of 10,000 sets a day recently, is issuing a series of bulletins termed "Tire Observation". These deal with the various phases of the tire situation and are educational.

The information contained in the leaflets is not confined to any one subject, as inflation for

example, but explains how mileage may be increased and service of shoes prolonged. This is in keeping with the policy of the company to co-operate with users of its products.

ELECTRIC VEHICLE CONVENTION.

National Association to Hold Fifth Annual Event at Philadelphia in October.

The fifth annual convention of the Electric Vehicle Association of America will be held in Philadelphia during October. The exact dates have not as yet been made public. The Philadelphia section, organized during the present administration, and now numbering 50 members, is planning to make the 1914 event one of the most interesting and constructive that the association has ever held.

The papers to be presented this year will be unusually high grade and will treat extensively a large number of pertinent subjects. The titles and authors will be made known from time to time. An effort is being made to have all papers printed and available fully one month in advance of the convention so that sufficient time will be given for their proper study and consideration.

It will be interesting to note that at the time of the last convention held in Chicago, the association had 437 members, and sections in New England and Chicago, aside from the general office activities in New York. At this time the association has about 650 members, a gain of over 200 during five months, or at the rate of about 500 new members a year. It is expected that the 1000 mark will be attained by next October.

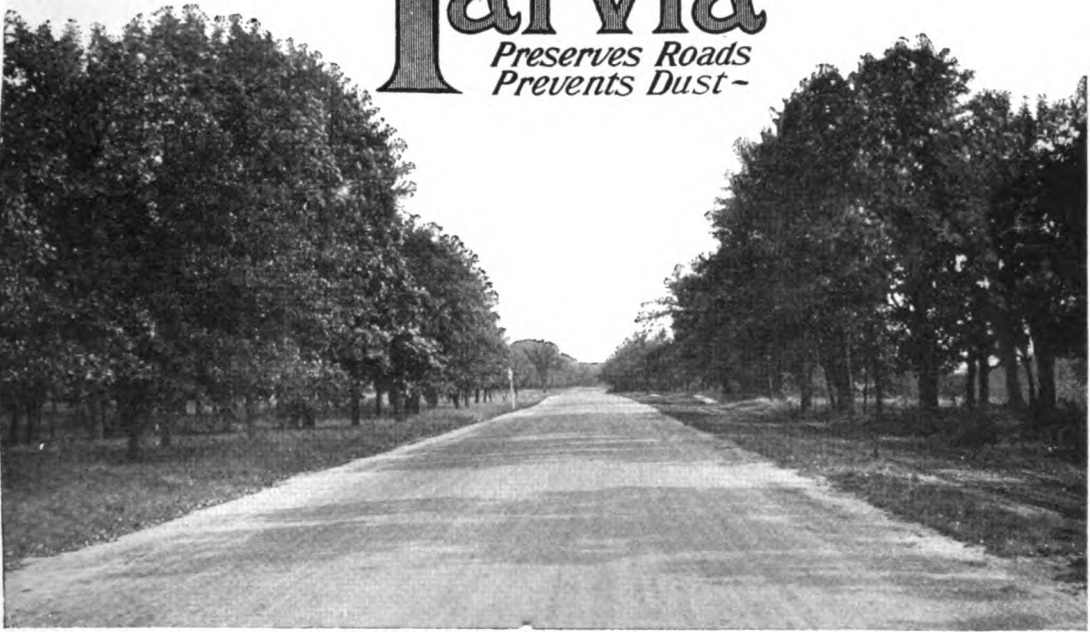
Pending the announcement of the convention committees, any and all communications regarding the Philadelphia convention should be addressed to the executive secretary, United Engineering Societies' building, 29 West 39th street, New York City.

OVERHAULING THE MOTOR CAR.

Attention is specially directed to the April 25 issue of The Automobile Journal, which will be the annual overhaul and equipment number. An effort will be made to present descriptions and illustrations of such equipment making for economy of time and labor. Manufacturers' data must be in the hands of the editor not later than April 18 to insure its publication.

Tarvia

*Preserves Roads
Prevents Dust -*



Boulevard, East Side Mississippi River, Minneapolis, Minn. Treated with Tarvia.

Automobile-Proof Highways

THE automobile has changed the problems of the road builder. What is required now is a form of construction which will not only give a good road surface the whole year round, but which will resist the abrasive action of automobile driving wheels. Tarvia furnishes the solution.

Tarvia is a dense, viscid coal tar product, resistant to weather, water and traffic. It has the property of sticking to cold stone and retaining its adhesiveness for many years.

It forms a matrix about the stone, making a Tarvia-concrete which is waterproof and automobile-proof. Being slightly viscid and plastic, it is not abraded by automobile driving wheels

but is simply rolled down. No dust is formed and no mud.

The cost of maintenance is so greatly reduced as to more than offset the cost of the Tarvia.

Suburban streets should be tarviated to secure a handsome, cleanly, mudless pavement at a low cost. Automobile thoroughfares and highways should be tarviated to keep down the maintenance expense. Park and cemetery roads should be tarviated to make them dustless and sightly. Boulevards should be tarviated because no other form of macadam will stand the traffic.

Booklets on request.

BARRETT MANUFACTURING COMPANY

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Cincinnati Minneapolis Pittsburgh Seattle Birmingham
THE PATERSON MFG. CO., Ltd.: Montreal Toronto Winnipeg Vancouver St. John, N. B. Halifax, N. S. Sydney, N. S.



When Writing to Advertisers, Please Mention The Automobile Journal.

OFFER CASH PRIZES.**Emil Grossman Manufacturing Company to Give \$850 to Winning Drivers Using Its Product.**

The Emil Grossman Manufacturing Company, Inc., has decided to repeat its offer of cash prizes to contestants in the 500-mile Indianapolis race, and has authorized the officials to announce the following cash prizes, providing the drivers finishing in the first three places use Red Head spark plugs: To the driver finishing first, \$500; to the second, \$250, and to the third, \$100.

REMY SERVICE IN WAR.**El Paso, Tex., Expert Crosses Line into Mexico and Corrects Rebel Commander's Magneto.**

The following story is told as evidence of the service given its customers by the Remy Electric Company, Anderson, Ind., maker of the Remy magneto, etc.: General Caranza of the rebel forces in Mexico utilizes an Overland car and while at Juarez his operator experienced

trouble in starting. Despite repeated crankings and primings, the motor refused to respond. An onlooker informed the driver that the Remy company maintained a service station at El Paso, Tex., and the station was called on the 'phone. D. O. Cook, the resident expert, responded and within a few minutes after his arrival corrected the trouble, which proved to be a frayed wire.

DEALERS ORGANIZE.**Greensburg, Penn., Association to Hold Show in New Building on April 9-11.**

The motor car dealers of Greensburg, Penn., have organized and the new body has taken the name of the Westmoreland County Automobile Dealers' Association. The following are the officers: President, Charles Walters, Greensburg Auto Company; vice president, Gene Grey, Westmoreland Motor Car Company; secretary, William Van Horne, Greensburg Auto Company; treasurer, William Berlin, Patterson Berlin Auto Company.

The first annual show of the association will be held in the new Rose building, Greensburg, Penn., April 9 to 11 inclusive. The entire space of 208 by 105 feet will be filled with motor cars, cyclecars, motorcycles and accessories. The decorations will be very elaborate and music will be furnished by Wallace's Vocal Orchestra of Cleveland, O. The organization was effected through the efforts of L. J. Ward of Pittsburg, Penn., who will manage the show.

EQUIPPING THE GARAGE.

The purchaser of a new machine who intends to attend personally to its upkeep, will find many valuable suggestions dealing with the selection of the garage equipment in the annual overhaul and equipment number of The Automobile Journal of April 25.

The following concerns have been elected to membership in the Motor and Accessory Manufacturers: A. C. Smith, Milwaukee, Wis., axles, pressed steel hubs, etc.; Detroit Pressed Steel Company, Detroit, motor car frames and pressed steel parts; the Forbes Varnish Company, Cleveland, varnishes; the Van Sicklen Company, Aurora, Ill., speedometers; the English & Mersick Company, New Haven, Conn., automobile hardware, trimmings, lamps, etc.

THE HEINZE ELECTRIC COMPANY

MANUFACTURERS OF

Ignition and Generating Apparatus LOWELL, MASS.

Factory and Main Office:
LOWELL, MASS.

Sales Office:
DETROIT, MICH.

will dissolve in the water and stop that leak
in the radiator or water
jacket

SE-MENT-OL

ASK YOUR DEALER OR WRITE DIRECT
MANUFACTURED ONLY BY
THE NORTHWESTERN CHEMICAL CO. Marietta, O.



Four and Six-Cylinder Models

We invite correspondence from
responsible dealers

Stutz Motor Car Company
INDIANAPOLIS, IND.



Bosch Magneto

For Ford Cars

**More Power
More Speed
More Pleasure
More Economy**

A FORD engine is made remarkably powerful, speedy and economical by fitting a Bosch High Tension Magneto to replace the coil system regularly used.

By means of the Bosch-Ford Attachment the Bosch Magneto can be fitted in a few hours to any Ford Car—no coils, no complications, but an all-efficient, no-worry ignition system, the same as is now being used by the world's most prominent cars.

The Trade and Ford Owners can obtain instructive and convincing literature by writing for the Bosch-Ford Booklet, sent free on request.

Be Satisfied

Correspondence Invited

Specify Bosch

Bosch Magneto Co., 204 West 46th Street, New York

Space Contributed by The Automobile Journal.

\$5.00 Sent to Emory W. Clark, up in
Detroit makes you a Life Member of
THE ANTI-PIKERS ASSOCIATION OF AMERICA

One of these days you are going to get up, look the old boat over and say: "Well, wife, let's start for Market Street" or "Let's drive to Broadway."

Not a bit ridiculous!

When they get that **Lincoln Highway Finished** YOU CAN DO THAT VERY THING. It will be a joy to ride over it. You know how the pneumatics feel under you **ON YOUR OWN BOULEVARD**. That favorite boulevard in your own town has been worth **HUNDREDS OF DOLLARS** in **PERSONAL SATISFACTION**.

It's no pipe dream! It's a positive plan. It will be done!

Builders of motor cars and tire and other manufacturers have contributed millions. Cement makers have followed suit. Now we fellows with the cars should come across with our five spots or MORE.

We get in on the ground floor, but we get in **EASIER**. Europe can't touch a tour over this Highway from Broadway to Market Street, when it comes to **REAL NATURE THRILLS**, smooth going, wonderful scenery and **OZONE** that will put leather lungs in everybody.

THERE'S YOUR CHECK BOOK. You've got the manhood, the pen and the ink. **DO IT NOW!** They're waiting for you to sign. Pin this coupon to your check.

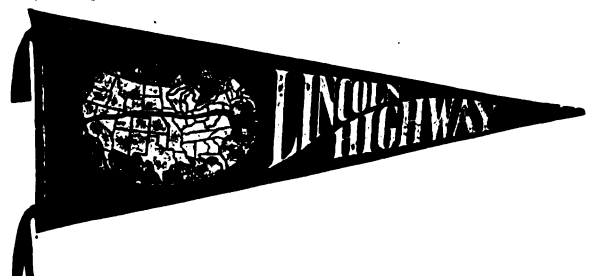
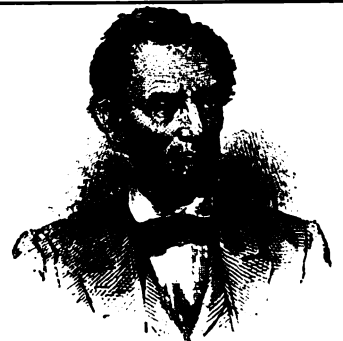
I am a regular motorist.

My name is.....

My address is.....

Herewith I contribute \$.....

Send me a contributor's certificate, membership card and radiator emblem.



The Lincoln Highway Association, Detroit, Mich.

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THE TRI-PHOON CAR PUMP

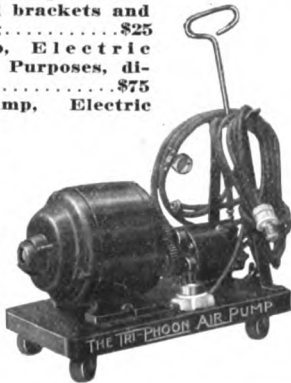
Simple—durable—small—light—and can be attached to any make of car. Highest efficiency—can be operated at any speed without injury to working parts. Will deliver at 800 revolutions a minute a steady flow of fresh air equal to the pressure from an air tank charged at 115 pounds to the square inch. Size 6" long, 4" high, 4" wide.

THE TRI-PHOON GARAGE PUMP

Delivered ready for instant use. Small and compact—takes but little room in garage. Either direct or alternating current motors furnished. Mounted on neat truck with handle. All are guaranteed.

PRICES FOR CAR AND GARAGE TRI-PHOON PUMPS.

- 3-Cylinder Air Pump, complete with hose and gauge\$20
 - 3-Cylinder Air Pump, complete with hose and gauge and brackets and gears for attaching.....\$25
 - 3-Cylinder Air Pump, Electric Driven, for Garage Purposes, direct current\$75
 - 3-Cylinder Air Pump, Electric Driven, for Garage Purposes, alternating current \$80
 - 6-Cylinder Air Pump, Electric Driven, for Garage Purposes, alternating or direct current\$95
- Write for Descriptive Matter.



Green & Swett Co.
Manufacturers
737 Boylston St., Boston, Mass.

MOTOR PARTS COMPANY

OFFICIAL

BOSCH DISTRIBUTOR

Zenith Carburetor Mohawk Tires Leak-Proof Rings

185-187 Columbus Avenue, BOSTON
818 No. Broad St., PHILADELPHIA SPRINGFIELD, MASS.**EVERYTHING FOR THE AUTOMOBILE****WATTE AUTO SUPPLY CO.****Manufacturers and Jobbers**

81 Exchange Place

Providence, R. I.

"4" Touring Car \$1050

"6" Landau-Roadster \$1860

"6" Touring Car \$1575

"6" Sedan \$2250

BUY IT BECAUSE IT'S A STUDEBAKER
Studebaker Corporation of America Detroit, Mich.**BETHLEHEM FIVE SPARK PLUGS****MAKE IGNITION CERTAIN!****Develop More Power on Less Fuel**

A type for every engine. BOOKLET FREE.

The Silve Company

Sixty Wall St.

New York

**AUTOMOBILE
ELECTRIC LIGHTING SPECIALTIES**For the Automobile Owner and Manufacturer
who wants SERVICE for his money**ELECTRIC LIGHTING SPECIALTIES Made to Order****CULVER-STEARN'S MFG. CO.**

Worcester, Mass.

Detroit, Mich.

**GEISZLER NON-SULPHATING
STORAGE BATTERIES**

Guaranteed perfect satisfaction or money refunded

SIZE 66 - \$20.00**GEISZLER BROS. STORAGE BATTERY COMPANY**
514 West 57th Street, New York City**ANNULAR BEARINGS REGROUND**

A complete stock of reground bearings of all sizes and makes on hand for immediate exchange. Also a complete stock of New Annular, Thrust and New Departure Double Row Bearings. Special bearings made on application.

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AHLBERG BEARING CO. CHICAGO. DETROIT. BOSTON

\$485.00

THE

\$485.00

Salvador Cyclecar

Four Cylinder Water Cooled Engine, Selective Transmission, Shaft-Driven Car Is the Answer to Practical Cyclecar Requirements.

The Salvador Motor Company, 126 Massachusetts Ave.
BOSTON, MASS.**ALDING PORCELAIN PLUGS**Regular
75c Value**50c**
EACH

Write for a gallon of the famous
"ALDING" OIL, in "DUCK" Can, 75c Delivered
ALSTEN & GOULDING COMPANY
36 Foster Street, Worcester, Mass.

F. SHIRLEY BOYD

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Boston, Mass.

Derian Demountable Rims.

J. H. S. Shock Absorber.

R. I. V. Ball Bearings.

Subscribe for**The Accessory and Garage Journal****The Trade Authority \$2.00 a year.**

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Classified Buyers' Guide

A Handy Reference for Purchasers

ACCESSORY MANUFACTURERS AND JOBBERS.

Alsten & Goulding Co., 36 Foster St., Worcester, Mass.

Auto Parts Co., Providence, R. I.

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

Miller, Chas. E., 97-103 Reade St., New York.

Branches: 202-204 Columbus Ave., Boston; Bridge and Dwight streets, Springfield, Mass.; 274 Trumbull St., Hartford, Conn.; 924 Eighth Ave. and 2782 Broadway, New York; 1421 Bedford Ave., Brooklyn, N. Y.; 313 No. Broad St., Philadelphia; 824 Main St., Buffalo, N. Y.; 1829 Euclid Ave., Cleveland; 227 Jefferson St., Detroit; 259 Peachtree St., Atlanta, Ga.; 601-603 Baronne St., New Orleans, La.; 135 Central Ave., Albany, N. Y.; 274 Halsey St., Newark, N. J.

Milwaukee Auto Specialty Co., 128 Second St., Milwaukee, Wis.

Motor Parts Co., 185-187 Columbus Ave., Boston; 818 No. Broad St., Philadelphia; Springfield, Mass.

Northwestern Chemical Co., Marletta, O.

Waite Auto Supply Co., 81 Exchange place, Providence.

ACETYLENE TANKS. (See Tanks.)

AIR COMPRESSORS AND TANKS.

Williams Foundry & Machine Co., Akron, O.

AMMETERS AND VOLTMETERS.

Hoyt Electrical Instrument Works, Penacook, N. H.

AUTOMOBILES. (See Cars.)

AUTOMOBILE SPECIALTIES.

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y. (Brass Goods.)

BALLS AND BALL BEARINGS.

Ahlberg Bearing Co., 2624 Michigan Ave., Chicago; 1786 Broadway, New York City; 805 Woodward ave., Detroit.

Boyd, F. Shirley, 903 Boylston St., Boston. (R. I. V.)

Hyatt Roller Bearing Co., Detroit.

Marburg Bros., Inc., 1790 Broadway, New York. (S. R. O.)

New Departure Mfg. Co., Bristol, Conn.

R. I. V. Co., 1771 Broadway, New York. (R. I. V.)

BATTERIES.

Electric Storage Battery Co., Philadelphia. (Exide.)

Gelsner Bros. Storage Battery Co., 514 W. 57th St., New York.

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City. (J-M.)

Waite Auto Supply Co., 81 Exchange place, Providence. (Success.)

BATTERY EXTINGUISHERS.

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

(Continued on Next Page.)

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PREMIER
AMERICA'S
GREATEST TOURING CAR
PREMIER MOTOR MFG. CO.
INDIANAPOLIS, INDIANA

CAMERON CARS
Mechanically Excellent

A remarkable lot of car value is contained in the 1914 CAMERON. Patented Four-Speed Transmission, Water Cooled, Electric Lighting and Starting. Price, \$1200.

See it. Examine it. Ride in it. You'll be convinced.

Get our literature—NOW.

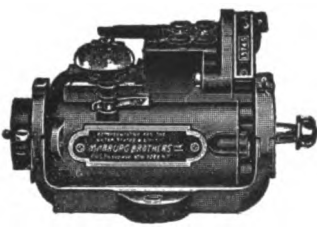
CAMERON MFG. COMPANY
NEW HAVEN, CONN.



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The performance of Eisemann Ignition Systems during the Indiana-Pacific Tour justifies every claim we have ever made for Eisemann efficiency and dependability.

The Eisemann Magneto Company
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Magneto
S. R. O. BALL BEARING

MARBURG BROS., Inc.,
Sole Importers
Detroit 1790 Broadway, New York Chicago

Jackson OLYMPIC - \$1500
4 cylinders

MAJESTIC - \$1975
4 cylinders

No Will Too Steep
No Bend Too Deep SULTANIC - \$2500
6 cylinders

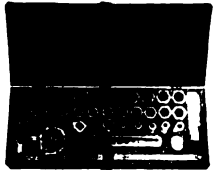
JACKSON AUTOMOBILE CO., 1203 East Main St. Jackson, Mich.

National
STOCK CHAMPION
FOUR AND SIX CYLINDER CARS
Electric Starter Electric Lights
National Motor Vehicle Co., Indianapolis

DIXON'S GRAPHITE CUP GREASE
For Motor Lubrication
Booklet No. 210
Made in JERSEY CITY, N. J., by the
JOSEPH DIXON CRUCIBLE CO. (3)

CATARACT TIRE SERVICE
THE 10% OVERWEIGHT TIRES
Guaranteed for 4000 Miles Service
Measured by Mileage, the Cheapest Shoes Ever Made.
Clincher and Quick Detachable, Plain and Break-Skid Treads, Regular and Metric Sizes, for All Standard Rims.
THE CATARACT RUBBER COMPANY
Boston, New York, Providence. Factory: WOOSTER, O.

VALVOLINE OIL CO.
Heavy, Medium and Light
Automobile Oils
27 STATE STREET BOSTON, MASS.

 Bay State Autokit, No. 1, \$10
Bay State Autokit, No. 2, \$7.50
Bay State Stickit, \$3
GEO. A. CUTTER, Sales Agent
Taunton, Mass.

HOW LARGEST PROFITS ARE MADE
We have some interesting facts in connection with increasing your car sales and profits.
Through merchandising strategy we have remedied these flaws. May we tell you about these things and about our kerosene-burning car, equipped with wire wheels, cow! dash, fuel tank? Left drive, center seat control, the most salable car offered today. Write or wire for the facts.
HENDERSON MOTOR CAR CO., INDIANAPOLIS, IND. 50

(BUYERS' GUIDE—Continued.)

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Springfield Metal Body Co., 20 Medford Ave., Springfield, Mass.

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Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City. (J-M Non-Burn.)

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Branches: F. Shirley Boyd, 903 Boylston St., Boston; C. D. Schmidt, 276 Canal St., New York City; N. A. Petry Co., 1427 Vine St., Philadelphia; F. E. Sparks, 1430 Michigan Blvd., Chicago; Fred Ward & Son, San Francisco.

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Williams Foundry & Machine Co., Akron, O.

BUMPERS AND FENDERS.

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.

Sager Co., J. H., 271 South Ave., Rochester, N. Y. (Diamond.)

CARBON REMOVERS. (See Cylinder Cleaning Compound.)

CARS—ELECTRIC PLEASURE.

Baker Motor Vehicle Co., Cleveland. (Baker.)

CARS—GASOLINE PLEASURE.

American Volturette Co., Detroit. (Keeton.)

Austin Automobile Co., Grand Rapids, Mich. (Austin.)

Cartercar Co., Pontiac, Mich. (Cartercar.)

Cole Motor Car Co., Indianapolis, Ind. (Cole.)

Empire Automobile Co., Indianapolis, Ind. (Empire, Little Aristocrat.)

Haynes Automobile Co., 166 Main St., Kokomo, Ind. (Haynes.)

Henderson Motor Car Co., Indianapolis, Ind. (Henderson.)

Jackson Automobile Co., 1400 Main St., Jackson, Mich. (Jackson.)

Knox Automobile Co., Springfield, Mass. (Knox.)

Lexington-Howard Co., Connersville, Ind. (Lexington and Howard.)

Maxwell Motor Co., Inc., Detroit. (Maxwell.)

Metz Company, Waltham, Mass. (Metz.)

Moline Automobile Co., E. Moline, Ill. (Moline.)

National Motor Vehicle Co., 1033 22nd St., Indianapolis. (National.)

Nordyke & Marmon Co., Indianapolis. (Marmon.)

Owen & Co., R. M., 19 W. 62nd St., New York City. (Reo.)

Paige-Detroit Motor Car Co., Detroit. (Paige.)

Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)

Premier Motor Mfg. Co., Indianapolis, Ind. (Premier.)

Reo Motor Car Co., Lansing, Mich. (Reo.)

Studebaker Corp., Detroit. (Studebaker.)

Stutz Motor Car Co., Indianapolis. (Stutz.)

Velle Motor Vehicle Co., Moline, Ill. (Velle.)

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(BUYERS' GUIDE—Continued.)

White Co., The, 828 E. 79th St., Cleveland. (White.)
 Branches: 320 Newbury St., Boston; Broadway and 62nd St., New York; 629-633 No. Broad St., Philadelphia; 138-148 Beatty St., Pittsburg, Penn.; 610 S. Michigan Ave., Chicago; Market St. and Van Ness Ave., San Francisco; 120-122 Marietta St., Atlanta, Ga.; 74 Victoria St., Toronto, Can.
Willys-Overland Co., Toledo, O. (Overland.)

CARS—STEAM PLEASURE.

White Co., The, 828 E. 79th St., Cleveland. (White.)
 Branches: See Cars—Gasoline Pleasure.

CARS—GASOLINE COMMERCIAL.

Adams Bros. Co., Findlay, O. (Adams.)
Bessemer Motor Truck Co., Grove City, Penn. (Bessemer.)
Blair Mfg. Co., Newark, O. (Blair.)
Cartercar Co., Pontiac, Mich. (Cartercar.)
Commerce Motor Co., Detroit. (Commerce.)
Dart Manufacturing Co., Waterloo, Ia. (Dart.)
Driggs-Seabury Ordnance Corp., Sharon, Penn. (Vulcan.)
Federal Motor Truck Co., Junction and Leavitt Sts., Detroit. (Federal.)
Garford Co., Elyria, O. (Garford.)
General Motors Truck Co., 26 Cadillac Ave., Pontiac, Mich. (GMC.)
 Branches: New York, Chicago, Boston, Philadelphia, Kansas City.
Gramm-Bernstein Co., Lima, O. (B. A. Gramm's.)
Knox Automobile Co., Springfield, Mass. (Knox and Martin Tractor.)
Owen & Co., R. M., 19 W. 62nd St., New York City. (Reo.)
Palmer-Moore Co., Syracuse, N. Y. (Palmer-Moore.)
Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)
Reo Motor Car Co., Lansing, Mich. (Reo.)
Studebaker Corp., Detroit. (Studebaker.)
Tarrytown Motor Car Co., Inc., 1790 Broadway, New York City. (MotoKart.)
Velle Motor Vehicle Co., Moline, Ill. (Velle.)
Willys-Overland Co., Toledo, O. (Overland.)

CARS—ELECTRIC COMMERCIAL.

Baker Motor Vehicle Co., Cleveland. (Baker.)
Couple-Gear Freight-Wheel Co., 575 Buchanan St., Grand Rapids, Mich. (Couple-Gear.)
 Branches: 30th floor, Singer Bldg., New York; 178 Devonshire St., Boston.
General Motors Truck Co., 26 Cadillac Ave., Pontiac, Mich. (GMC.)
 Branches: See Cars—Gasoline Commercial.
General Vehicle Co., Long Island City, N. Y. (G. V.)

CARS—FIRE, POLICE AND MUNICIPAL SERVICE.

Cartercar Co., Pontiac, Mich. (Cartercar.)
Couple-Gear Freight-Wheel Co., 575 Buchanan St., Grand Rapids, Mich. (Couple-Gear.)
 Branches: See Cars—Electric Commercial.
Knox Automobile Co., Springfield, Mass. (Knox and Martin Tractor.)
White Co., The, 828 E. 79th St., Cleveland. (White.)
 Branches: See Cars—Gasoline Pleasure.
Willys-Overland Co., Toledo, O. (Overland.)

(Continued on Next Page.)

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EMCO
AUTOMOBILE OIL
 No. 300
 MANUFACTURED BY
EMERY MFG. CO.
 BRADFORD, PA.

If you really appreciate the value of a strictly mineral oil that's free from all animal, vegetable or carbon matter—an oil that will really preserve your car, you'll use only

EMCO OIL

GUARANTEE
 If Emco Oil does not prove satisfactory to YOU in absolutely every respect, we will refund your money in FULL—pay freight (both ways if oil is returned) and make no charge for oil used in trial.
 If your dealer cannot supply you, we will ship Emco direct to you in five or ten gallon cans, barrels or half-barrels.

EMERY MANUFACTURING CO.
 LEWIS EMERY, Jr., Pres.
 General Office: 45 Main St., BRADFORD, PA.
 Strictly Independent Dealers.
 N. Y. Branch: 155 U. S. Rubber Bldg.



\$2400
 Completely Equipped

MOLINE KNIGHT

Four-cylinder, five-passenger, 50 horsepower, 128-in. wheelbase.

Bosch ignition, Wagner electric starting and lighting, \$2400.

The car of the future will not have poppet valves

Moline Automobile Co., East Moline, Ill.



J-M AUTOMOBILE SUPPLIES

Brake Lining	Friction Tape	Packings
Spark Plugs	Fire Extinguishers	Cements
Dry Batteries	Radiator Shields	Fuses
Lighting Systems	Speedometers	Horns, Etc.

Write for Booklet

H.W. JOHNS-MANVILLE CO.
 NEW YORK AND EVERY LARGE CITY



Ford Owners
Rusco
Transmission Brake Lining
Solves the Problem

"RUSCO"
Complete Equipment
Rusco Brake Lining
Including Rivets for
FORD AUTOMOBILE

THE RUSCO Ford Brake Lining Is Made Wholly of Long Fibre Asbestos. There Is No Wire In It and It Is Guaranteed Not to Short Circuit the Magneto.

The RUSCO, Which Is Made Especially for Ford Cars, Is Water, Oil and Friction Heat Proof. Stops the Car Easily and Quietly and Does Not Strain the Working Parts.

Made in All Sizes and Widths up to and Including 9" Wide by $\frac{1}{2}$ " Thick.

RUSCO Ford Brake Lining Comes Packed in a Special Box Sufficient to Equip the Car, as Well as Copper Rivets for Application. Price, \$1.00.

Order from Nearest Dealer or Direct from Us.
RUSSELL MFG. CO. MIDDLETOWN, CONN.

THE JOHN V. WILSON CO.
220 Motor Mart, Boston, Mass. N. E. Selling Agent

Elyria-Dean
Trade Mark

REXO III \$3⁸⁵

The GARFORD MANUFACTURING COMPANY, 2506 Olive St., ELYRIA, O.
Successors to THE DEAN ELECTRIC COMPANY.

EMPIRE The Completely Equipped Empire
five-passenger touring car \$900
"The Little Aristocrat"

New Series Model 31
NOW
\$900

Advance catalogue is ready
We will send the pictured
story of the Transcontinental
Empire on request.

Empire Automobile Co., Indianapolis, U. S. A.

BRAENDER TIRES & TUBES

Are of the highest quality and the cheapest on mileage. They are built to last. Send for price list and particulars.

BRAENDER RUBBER & TIRE CO.
Main Office and Factory RUTHERFORD, N. J.

(BUYERS' GUIDE—Continued.)**CEMENTS.**

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

Northwestern Chemical Co., Marietta, O. (Se-ment-ol Ra-diator.)

CHAINS, TIRE, AND ANTI-SKIDDING DEVICES.

Weed Chain Tire Grip Co., 28 Moore St., New York.

CHAINS—TRANSMISSION OR DRIVING.

Boyd, F. Shirley, 903 Boylston St., Boston. (Baldwin.)

Miller, Chas. E., 97-103 Reade St., New York. (Brampton.)

Branches: See Accessory Manufacturers and Jobbers.

COILS.

Heinze Electric Co., Lowell, Mass.

CYLINDER CLEANING COMPOUND.

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.

Milwaukee Auto Specialty Co., 128 Second St., Milwaukee.

Northwestern Chemical Co., Marietta, O. (Carbonox.)

Prest-O-Lite Company, 226 Speedway, Indianapolis (Prest-O-Carbon Remover.)

Branches: Atlanta, Baltimore, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Indianapolis, Jacksonville, Kansas City, Los Angeles, Milwaukee, Minneapolis, New York, Omaha, Philadelphia, Pittsburgh, Providence, San Francisco, Seattle, St. Louis and St. Paul.

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Culver-Stearns Mfg. Co., Worcester, Mass.; Detroit.

FIRE EXTINGUISHERS.

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

Northwestern Chemical Co., Marietta, O. (Fire-Fly.)

Pyrene Co. of New England, 176 Federal St., Boston.

FORD AUTOMOBILE EQUIPMENT.

Russell Mfg. Co., Middletown, Conn.

FUNNELS.

Dover Stamping & Manufacturing Co., Cambridge, Mass. (Dover.)

GASKETS AND GASKET CUTTERS.

Shawver Co., Springfield, O.

GEARS, STEERING.

Ross Gear & Tool Co., 794 Heath St., Lafayette, Ind.

GUNS, GREASE. (See Pumps, Oil and Grease.)

HORNS.

Dean Electric Co., Elyria, O. (Tuto.)

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

(Continued on Next Page.)

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(BUYERS' GUIDE—Continued.)

Kent Mfg. Works, Atwater, 4937 Stenton Ave., Wayne Junction, Philadelphia. (Monoplex.)

IGNITION EQUIPMENT.

Kent Mfg. Works, Atwater, 4937 Stenton Ave., Wayne Junction, Philadelphia.

INSULATION.

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

JACKS, ETC.

Shawver Co., Springfield, O.

LAMPS, TAIL. (See Tail Lights.)

LIGHTING SYSTEMS, ELECTRIC.

Apple Electric Co., Dayton, O. (Apelco.)

Dean Electric Co., Elyria, O. (Dynalux.)

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

LUBRICANTS.

Alsten & Goulding Co., 36 Foster St., Worcester, Mass. (Alding.)

Borne, Serymser Co., 80 South St., New York. (Colonial.)
Branches: Boston, Fall River, Philadelphia.

Dixon Crucible Co., Jos., Jersey City, N. J. (Graphite.)

Eagle Oil & Supply Co., 104 Broad St., Boston. (Eagle-line No-Karbon.)

Harris Oil Co., A. W., 326 South Water St., Providence. (Harris.)
Branch: 143 No. Wabash Ave., Chicago.

Haws, Geo. A., 148 Front St., New York. (Panhard.)
Branch: 899 Boylston St., Boston.

Invader Oil Co., 80 Broad St., New York. (Invader.)
Branches: 284 Columbus Ave., Boston; 113 Arch St., Philadelphia; 512 Kenos Bldg., 11th and G Sts., N. W., Washington, D. C.

Miller, Chas. E., 97-103 Reade St., New York. (Pan-American.)
Branches: See Accessory Manufacturers.

New York & New Jersey Lubricant Co., 165 Broadway, New York. (MoToRol, Non-Fluid, Kejex.)

Northwestern Chemical Co., Marietta, O. (Gear-Silence.)

Platt & Washburn Refining Co., 7 Broadway, New York City. (Veedol.)

Standard Oil Co., New York. (Polarine.)
Branches: In all cities.

Texas Company, The, 7 West St., New York.
Branches: Boston, Philadelphia, Chicago, St. Louis, Norfolk, Atlanta, New Orleans, Dallas, El Paso, Pueblo, Tulsa, Houston.

Vacuum Oil Co., Rochester, N. Y. (Mobiloil.)
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Valvoline Oil Co., 27 State St., Boston. (Valvoline.)

MAGNETOS AND SUPPLIES.

Bosch Magneto Co., 223-225 W. 46th St., New York.

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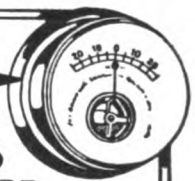
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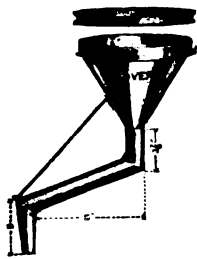
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Model 7, \$1250
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Owners' Auto List Co., Albany, N. Y.

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New York Coll Co., 338 Pearl St., New York City.

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Dover Stamping & Manufacturing Co., Cambridge, Mass. (Auto and Savol.)

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Northwestern Chemical Co., Marietta, O. (Hydrometers and Thermometers.)

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Apple Electric Co., Dayton, O. (Apelco.)

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.

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Johns-Manville Co., H. W., Madison Ave. and 41st St. New York City.

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Northwestern Chemical Co., Marietta, O. (Never-Rust.)

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McQuay-Norris Mfg. Co., Dept. D, St. Louis, Mo. (Leak-Proof.)

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International Metal Polish Co., Quill St. and Belt R. R. Indianapolis, Ind. (Blue Ribbon.)

Johns-Manville Co., H. W., Madison Ave., and 41st St. New York City.

Northwestern Chemical Co., Marietta, O.

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Duelec Vaporizing Primer Co., 14 North Broadway, Yonkers, N. Y. (Duelec Vaporizing.)

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Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.

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Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.

Green & Swett Co., 737 Boylston St., Boston. (Tri-Phoon Car and Garage.)

Shawver Co., Springfield, O.

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Radiator Fix Co., 121 Massachusetts Ave., Boston. (Rad-Fix.)

REAMERS.

Martell Motor Co., 1928 Columbus Ave., Boston. (Martell Aligning.)

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Boyd, F. Shirley, 903 Boylston St., Boston. (Dorian.)

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Branches: Chicago, Philadelphia, Boston, St. Louis, Cleveland, Pittsburgh, Cincinnati, Kansas City, Minneapolis, New Orleans, Birmingham, Ala.; Seattle, London, Eng.; Montreal, Toronto, Winnipeg, Vancouver, Can.; St. John, N. B.; Halifax, N. S.

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are the real standard of plugdom—soot-proof, gas proof, and unbreakable.

SPLITDORF PLUGS are ECONOMIC in that they "stand up" under the hardest usage better than any other plug on the market.

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NON-FLUID OIL
UNITED STATES PATENT OFFICE

This reliable and effective lubricant is indorsed by the majority of the leading auto manufacturers. Non-Fluid Oil produces a strong film between the bearing surfaces, which will not thin out under the action of frictional heat and allow them to come together. Non-Fluid Oil will not gum and harden in cold weather after the manner of ordinary grease. The frequent repairs and unexpected expenses due to the use of ordinary oils and greases are entirely eliminated when Non-Fluid Oil is employed. Efficiency and economy in motor car operation demands the use of this reliable lubricant. Non-Fluid Oil comes packed in only orange enamelled cans bearing the above trade mark. See that you get it.

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The Fastest Riding
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Chemically removes carbon from cylinders,
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INCREASES POWER 20 PER CENT.

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For Perfect Control and Safe, Comfortable Driving use

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Sager Co., J. H., 271 South Ave., Rochester, N. Y. (Peerless.)

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Northwestern Chemical Co., Marietta, O. (Dermalena.)

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Ainsen & Goulding Co., 36 Foster St., Worcester, Mass. (Alding.)

Bosch Magneto Co., 223-225 W. 46th St., New York.

Branches: See Magnetos and Magneto Supplies.

Heinze Electric Co., Lowell, Mass. (H. E. Co. Priming.)

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

Mosler, A. R., & Co., P. O. Box M, Mt. Vernon, N. Y. (Split-Fire.)

Silvex Company, The, 60 Wall St., New York City. (Bethlehem Five Point.)

Spiltdorf Electrical Co., 98 Warren St., Newark, N. J.
Branches: See Magnetos and Magneto Supplies.

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SPRINGS FOR AUTOMOBILE SUSPENSION.

Marburg Bros., Inc., 1790 Broadway, New York. (Marburg-Hagen.)

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Hoyd, F. Shirley, 903 Boylston St., Boston. (Baldwin.)

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Ward's Sons, E. T., 25 Purchase St., Boston, Mass. (Seamless.)

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(BUYERS' GUIDE—Continued.)

TAIL LIGHTS.

Combination Tail Light Co., 954 Tremont St., Boston.
(Universal Electric.)

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Harding Specialties Co., Inc., 755 Boylston St., Boston.
(Boston.)

TANKS, ACETYLENE GAS.

Prest-O-Lite Company, 226 Speedway, Indianapolis.
(Prest-O-Lite.)
Branches: See Cylinder Cleaning Compound.

TANKS, TIRE INFLATING.

Prest-O-Lite Company, 226 Speedway, Indianapolis.
(Baby Tire Filler, The Emancipator.)
Branches: See Cylinder Cleaning Compound.

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Branches: See Rims—Removable and Detachable.

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They are absolutely gas tight. They have no equal for speed and power. The Plug with the **STONE INSULATOR**. Made to fit *any engine, any thread.*

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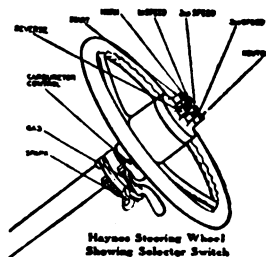
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Next issue April 22.

Accessory and Garage Journal
TIMES BUILDING, PAWTUCKET, R. I.

(BUYERS' GUIDE—Continued.)

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Polack Tyre and Rubber Co., 246 W. 59th St., New York City. (Polack.)

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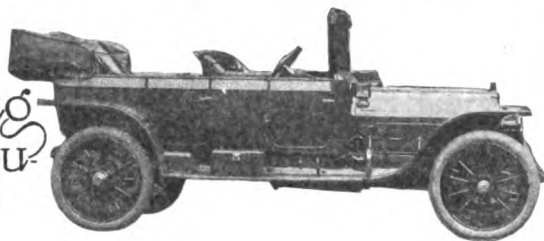
Prest-O-Lite Company, 226 Speedway, Indianapolis
(Prest-O-Welder.)
Branches: See Cylinder Cleaning Compound.

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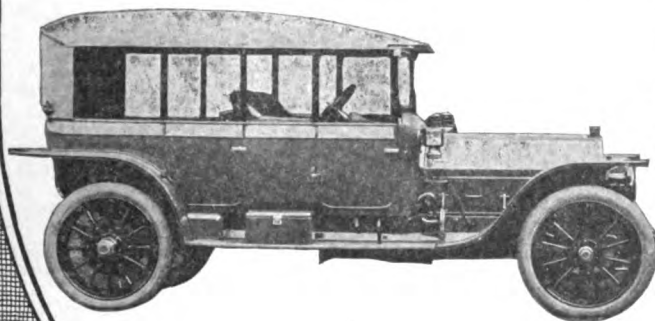
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The comfort of every car body combined. An instantaneously convertible equipment that affords a touring body or a limousine whenever desired.



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SPRINGFIELD CONVERTIBLE BODY is always ready and always has



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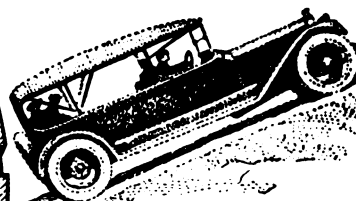
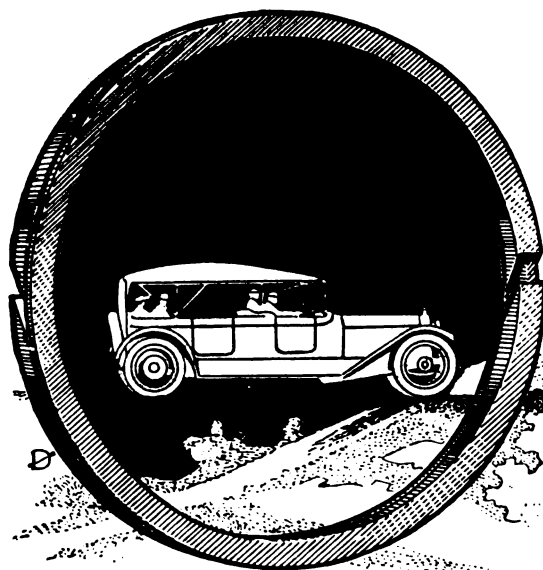
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MASS.

There's no leak proof ring but the **LEAK-PROOF** Ring



Takes the Slant Out of Hills:

- ❑ It's the up-hill work that puts the power plant of your car to the real, honest efficiency test.
- ❑ The amount of push your pistons are able to deliver decides whether you get up smoothly and freely or fight for every foot. You want *all* the power your

engine was designed to produce if the slant is to be taken out of the hill.

- ❑ It's only a matter of power then—full power is a matter of perfect compression, and perfect compression depends largely on piston rings. Leaky piston rings rob you of power at every stroke. With

MADE IN
ALL SIZES

LEAK-PROOF Piston Rings

EASILY
ADJUSTED

gas leakage is impossible, perfect compression results and the maximum delivery of power is obtained.

- ❑ The opening found in all one-piece piston rings is closed in the **Leak-Proof Ring** because the two sections interlock, each one sealing the slot in the other. These sections are concentric, not eccentric, so constructed that equally distributed tension gives equally perfect bearing on the cylinder walls. They are stronger than any other form of piston ring, either one-piece or of more than two pieces, because of their construction on the angle-iron principle,—only possible in this two-piece type. This is an exclusive and patented feature of the **Leak-Proof Ring**.

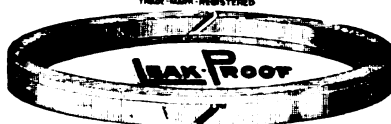
They are made of Processed Gray Iron,—softer than the cylinder yet more lasting than the motor.

- ❑ **Leak-Proof Piston Rings** ensure a strong, steady, normal pulse to your engine when your car is climbing hills as well as on level ground. They take the slant out of hills.
- ❑ **The Difference**—They never lose their spring and elasticity through constant heating and cooling off.
- ❑ They reduce carbonization to a minimum by keeping built-up surplus oil.
- ❑ They are continuously efficient—easily adjustable.

Send For Our Booklet—It tells all about Leak-Proof Piston Rings. Why you need them on your engine. How they can save fuel and conserve power. Send for it. It is free and informative.

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PISTON HEAD PACKING RINGS

Sold by all
up-to-date dealers, garages
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VOL. XXXVII. MAY 18, 1914

NO. 6.

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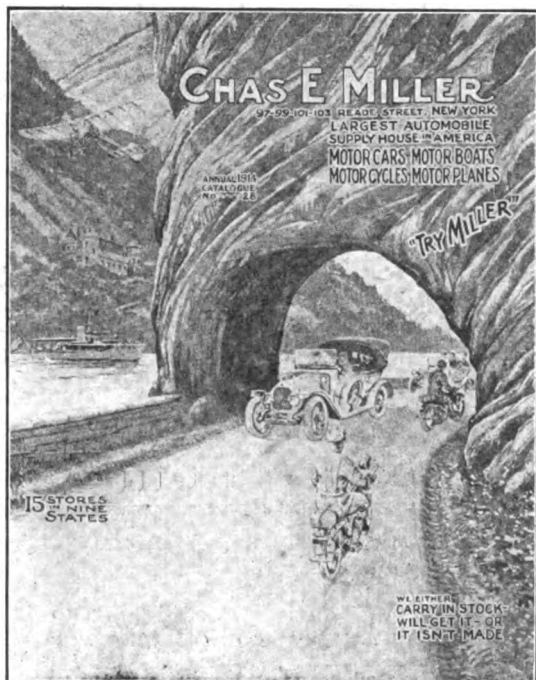
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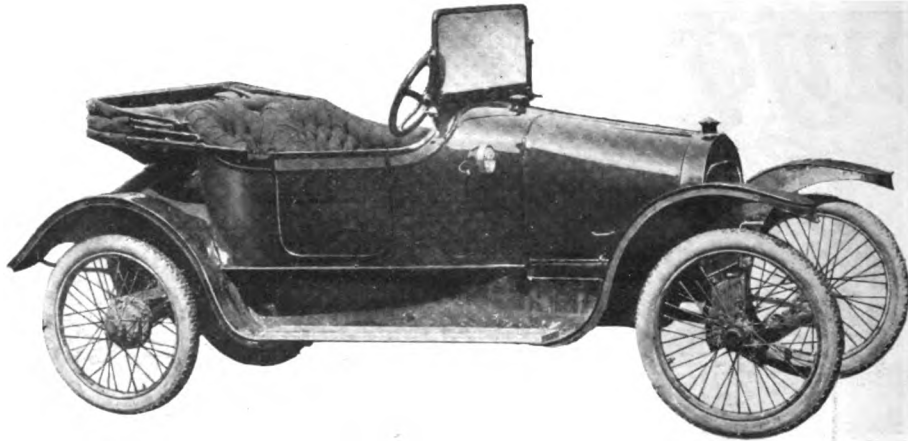
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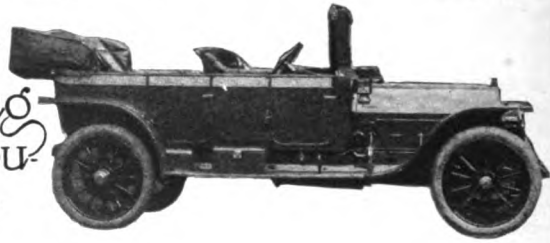
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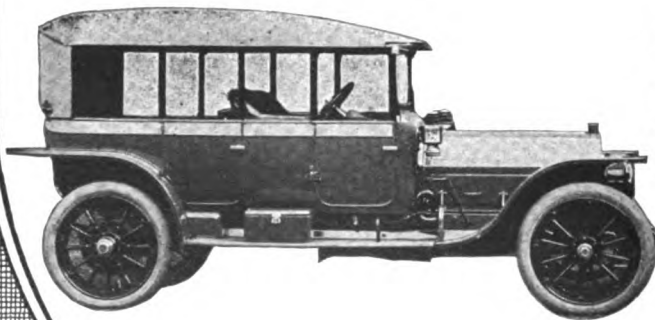
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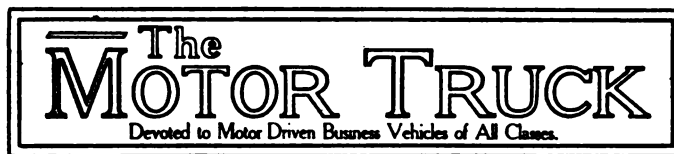
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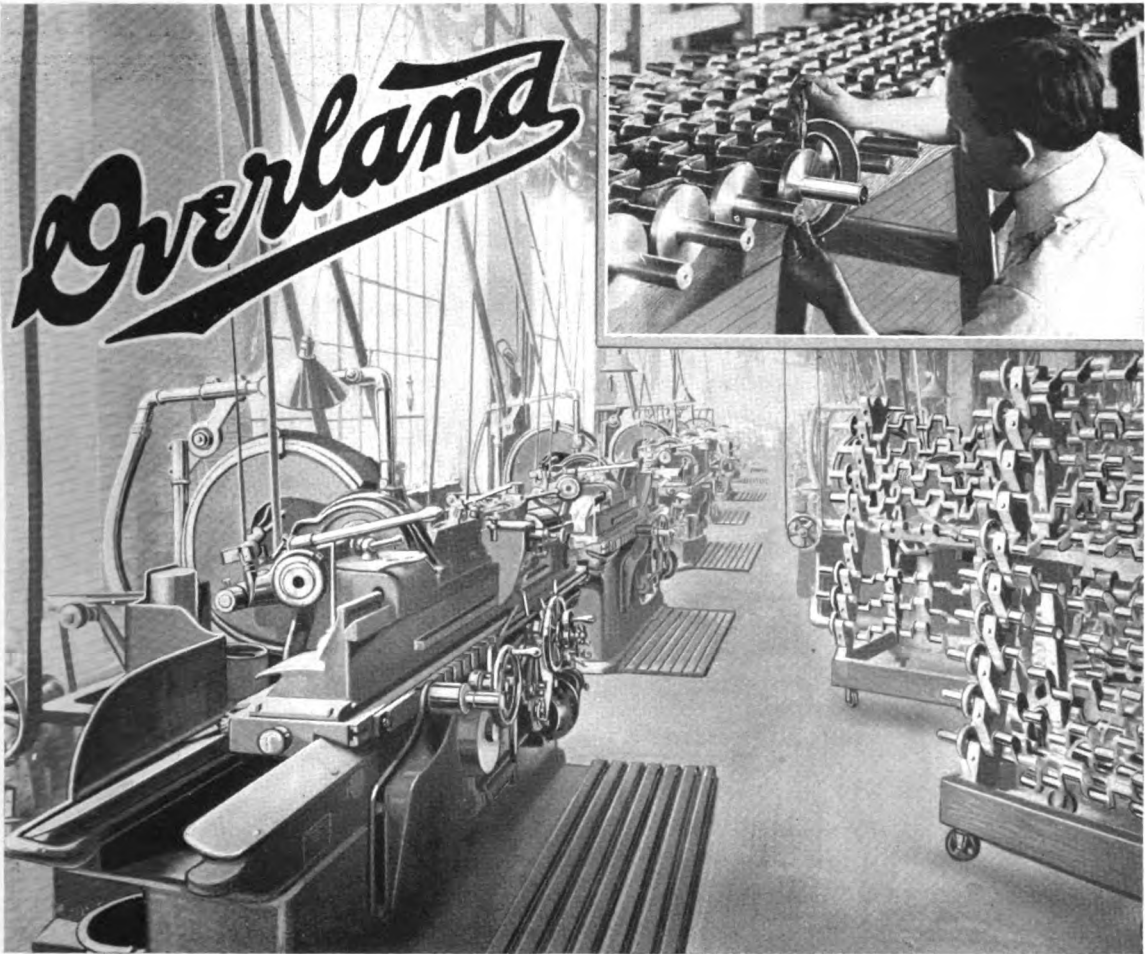
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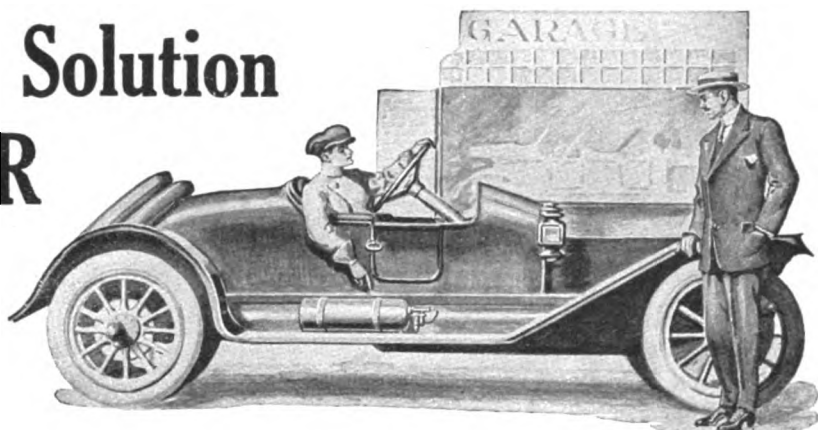
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You don't have to fool along with any unsatisfactory lighting system.

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Boston, Mass.

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Publisher's Comment.

The Eighth Annual Overhaul and Equipment Number of The Automobile Journal, dealing with the preparation of the car and its equipment, differs materially from previous issues, as will be noted by the accompanying table of contents. Each component of the chassis is treated separately and detailed instructions are given for ascertaining readily the repairs or replacements necessary.

The New Motorist, undertaking for the first time the overhaul of the machine, has been given special consideration and the limitations of the novice are carefully defined. As

ticle dealing with practical repair equipment. Various installations are also discussed.

Equipping the Private Garage is a problem that requires careful consideration to obtain the desired results with a minimum of expense. This subject is treated in detail, and suggestions are made as to storing and maintaining the automobile in an economical manner. The necessary equipment for the small, as well as the large, garage is described and illustrated.

The Special Index is so arranged that instructions for performing any particular work can be found readily. For example: If it be

Index to Overhaul and Equipment Features.

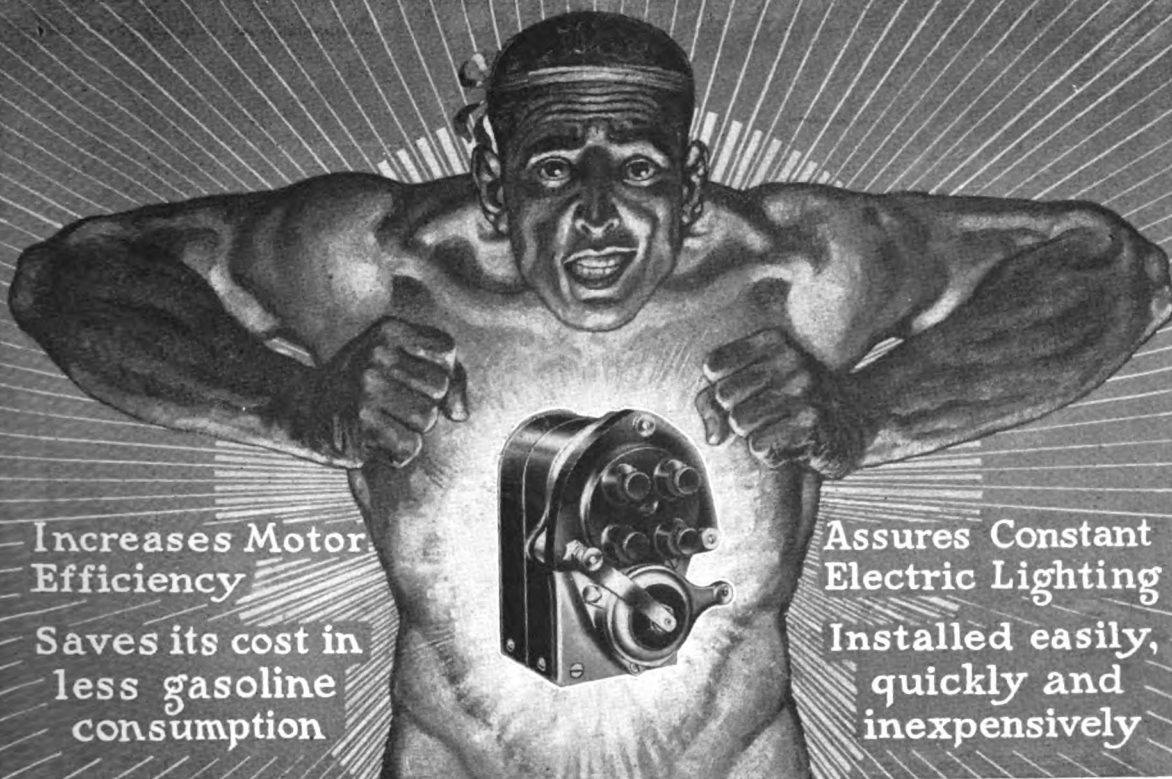
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the chassis components are illustrated and lettered, and instructions given for their inspection, the new owner should be able to estimate readily the work requiring the services of the expert.

The Tools and Supplies required for the overhaul are dealt with comprehensively, and valuable suggestions are given as to the selection and purchase of these members. A number of time and labor saving devices are also described and illustrated in a special ar-

desired to insert new corks in a clutch plate, look under the head of Clutches. Similarly, if one wishes to know how to adjust the contact points of a magneto, the article will be noted indexed under Ignition.

The Classified Buyers' Guide should always be consulted when compiling the list of tools, supplies, equipment, etc. The concerns listed are wholly reliable. When corresponding with advertisers, mention of The Automobile Journal will insure prompt attention.



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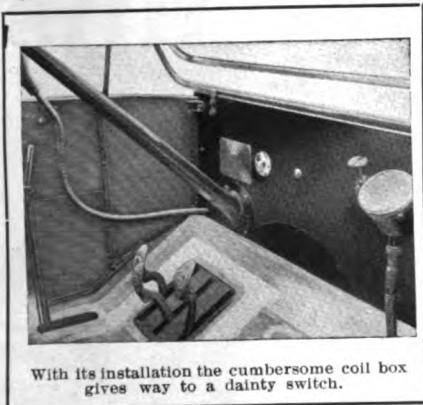
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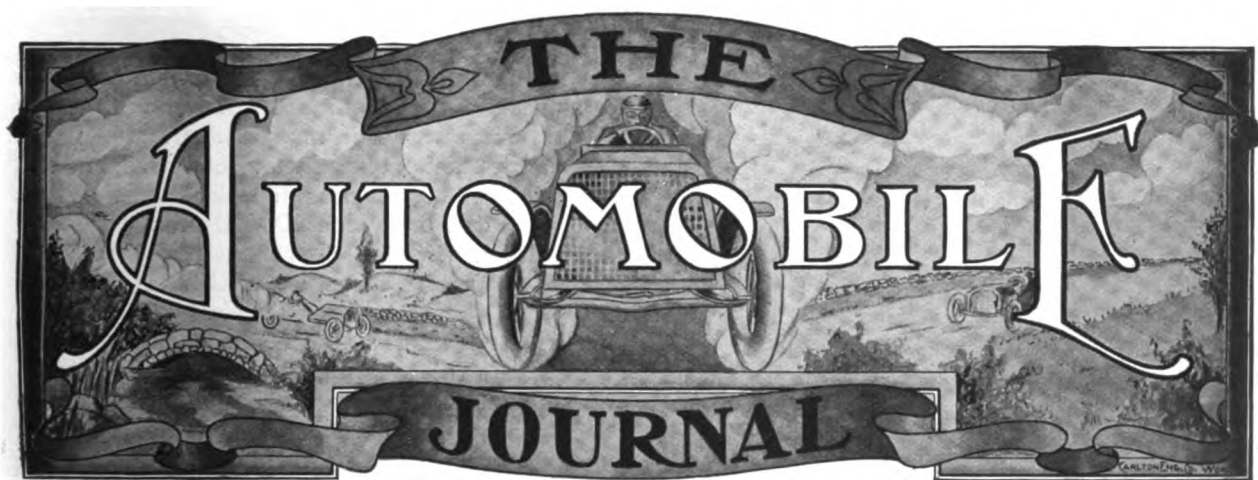
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VOL. XXXVII, No. 6

APRIL 25, 1914

Price, \$1.00 the Year

WIDESPREAD INTEREST IN GOOD ROADS.

Joint Committee Raised to Codify Existing Laws and Recommend Scientific System of Construction and Maintenance---Brief History of Road Making in This Country and Abroad---Available Funds and Plans for 1914.

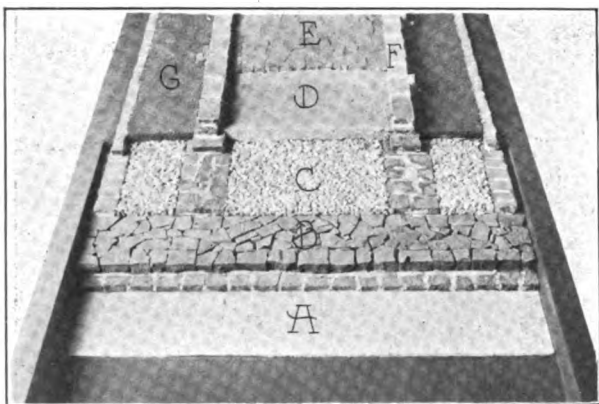
AGITATION, which had its inception with the old League of American Wheelmen, and which has been carried on unremittingly by automobile owners and users since the advent of this industry, is expected to result in a systematic revision of existing road laws on the statute books of the various states of the Union during 1914. The work is to be accomplished by a joint committee representing the American Highway Association and the American Bar Association, which already has received the active co-opera-

tion of the United States office of public roads, Department of Agriculture.

Interests decidedly opposed to the construction and maintenance of improved highways, when the subject was first broached and during the early days of the good roads movement as carried on by organized motorists, are now working in harmony with these bodies. There is no longer any disposition to question facts that have been made apparent as a result of the more general adoption of the mechanical transport in high-



Section of the Old National Pike, for Which Congress Made the Initial Appropriation in 1806, and Which Was Taken Over by Individual States in 1850, Government Aid Being Transferred to Railroad Development.



Model of the Appian Way, Constructed Under the Direction of Appianus Claudius in 312 B. C.

way haulage, and other practical demonstrations.

The joint committee is now busily engaged in preparing an index chart of existing road laws, this being based upon a complete literal compilation of such laws in all states, secured by the office of public roads. The first step will be to recommend that all obsolete, useless or unnecessary statutes be repealed, and the investigation already discloses, in several cases, accumulations of laws running back over 100 years that create an almost hopeless confusion.

Recommending Scientific System.

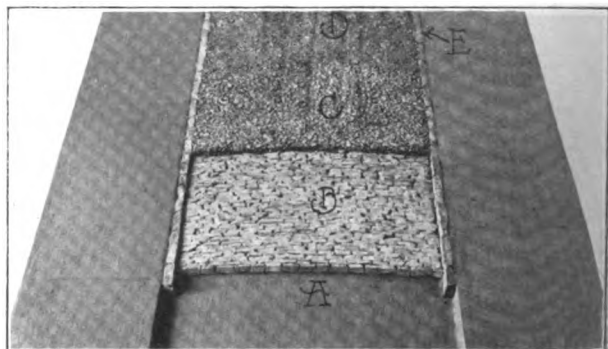
The next step will be to simplify and arrange in logical order those laws which still have merit, and then to suggest certain basic features of good administration, with a view to providing a scientific method of road construction and maintenance for the future. This is the point at which it may be expected that the joint committee will find the most determined resistance when its report is presented to the several state legislatures early in 1915. The effort will be toward the creation of state highway commissions, in charge of highway engineers, and, since a majority of the commonwealths have not as yet adopted this sys-

tem, it readily can be appreciated that the recommendations of the committee will come in the nature of an innovation in many instances.

When and where the first road was built is not known. Herodotus speaks of a great Egyptian road on which 100,000 men were employed for a period of 10 years. This was during the reign of Cheops, about 2500 B. C. According to the historian, this road was built of massive stone blocks 10 feet deep, and lined on both sides with temples, mausoleums, porticoes and statues. The streets of Babylon are said to have been paved in 2000 B. C., and the Euphrates was crossed by a stone bridge about the same time. The Chinese were building bridges as early as 2900 B. C. The ancient Peruvians had a wonderful system of national roads connecting all the principal parts of their empire.

The Appian Way.

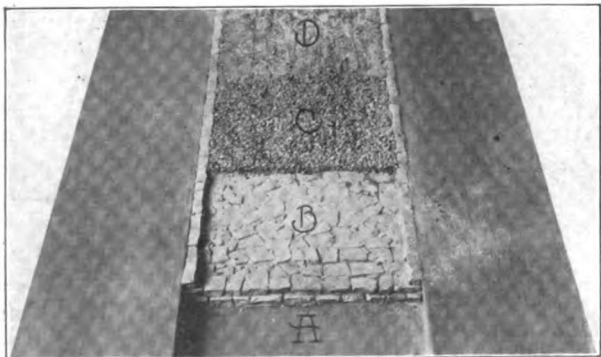
However, the first authentic information concerning the systematic construction and mainte-



Model of Tresaugnet Road Construction Begun in 1775 and Continued Under Napoleon's Management.

nance of permanent highways dates from the Roman period, and it is generally understood that the Romans learned the art from the Carthaginians. The first of these great Roman military roads was the Appian Way, begun under the direction of Appianus Claudius in 312 B. C. At that time it was built from Rome to Capua, 142 Italian miles, but it later was extended to Brundisium, a total of 360 miles, and probably was completed by Julius Caesar.

A model of this Appian Way, as prepared by the office of public roads, is reproduced herewith. A indicates the *contignatum pavimentum*, composed of lime and sand, straw, rushes, or reeds, and sometimes laid on sills or boards. B shows the *statumen*, or foundation, composed of two courses of flat stones laid dry or in lime mortar. The depth of this course was 16 to 18 inches. Next, came C, the *rudus*, or rubble, a layer of broken stone mixed with lime in the proportion



Model of the French Roads Laid by the Old Roman Method Under Administration of Colbert in 1666.

of one part of lime to three of stone. Sometimes the material was taken from old buildings, and the course was from six to nine inches deep. Section D represents the nucleus, coarse gravel and lime used hot, bricks, potsherds, or broken tile mixed with lime and covered with a thin layer of lime mortar. E was the pavimentum, or summa crusta, consisting of polygonal blocks joined with the greatest nicety. This course was about six inches deep and about 16 feet wide. F shows the curbs, which were two feet wide and 18 inches high, with mounting blocks, which served as seats for travellers or to aid the riders in mounting. G presents the side roads, the surface of which was composed of gravel flushed with mortar, and the width was from six to eight feet

Roman Road System.

The Roman construction often was varied, although always extremely massive. The general

gravel, and in some cases a mixture of sand and clay or clay and gravel was utilized.

This was the type of road constructed throughout the Roman empire, no less than 29 radiating from the city. Their total length is estimated at 50,000 miles. The Appian Way is said to have been in a good state of repair 800 years after it was built, but with the fall of the Roman empire all this splendid system was allowed to fall into decay, so that today but little more than a trace remains of these splendid achievements.

Early French Roads.

French roads are considered the best examples of modern construction. The present system really was founded by Napoleon, although there was a road system in France—excepting, of course, the Roman period—as early as 1660. Under the ministry of Colbert (1660-9), about 15,000



Section of Concrete Road in Bellefontaine, O., Laid in 1893-4, After Being Subjected to 20 Years of Traffic.

form of construction under Augustus Caesar, when Roman road building appears to have reached its height, was a massive road from 16 to 30 feet wide, from three to four feet thick, and laid in three or four courses. The first course, almost invariably consisted of large, flat field or quarry stones laid on earth, except in swamps, where poles, logs, brush or even boards were used beneath the stone course. The other courses varied considerably with the available material and the period and importance of the road. Small stones with and without mortar, gravel mixed with clay, broken brick, tiles, etc., and even earth were used for the second and third. The surface or wearing course consisted of well cut, irregular, close fitting polygonal blocks on a few of the more important ways, but more often uncut stones; not unlike cobble stone pavements,

miles of stone roads were built, the method of construction being modelled after that of the Romans. In the accompanying illustration, A indicates the earth foundation, which was rolled flat; B, the stone foundation, 18 feet wide and nine or 10 inches deep, composed of flat stones laid by hand in two or more layers; C, the layer of small stones, broken in place by hammers, and D, the finished surface, a course of stones broken by hand into sizes smaller than the underlying material and left to be consolidated by traffic. The total thickness of the road in the centre was from 18 to 20 inches and at the sides from 12 to 14.

Under Tresaguet and Napoleon.

After 1775, Tresaguet introduced the system which was improved by him under the guidance of Napoleon, who evolved a splendid adminis-

trative plan. In the illustration, A shows the earth foundation, with contour parallel to that of the finished surface; B, the stone foundation, composed of flat stones laid on edge, lengthwise across the road and beaten to an even surface, five inches deep; C, small stones laid and beaten by hand hammers, and D, the finishing layer of broken stones about the size of walnuts spread with a shovel. The crown was made six inches, the width 18 feet and the total thickness about 10

any definite attempt to study scientific methods of road construction and maintenance in this country, utilizing specially prepared tar binders, etc.

The first mention of the exaction of tolls is that given by Strabo, on the roads leading from Babylon to Syria, although it was not until 1346 A. D. that this system was generally adopted as a means of raising revenue for highway maintenance and repair. The first toll road in the United States was the Lancaster pike, between Philadelphia and Lancaster, Penn., a distance of 62.5 miles, the construction of which was authorized in 1792.

The more recent agitation for national highways, either constructed entirely at the expense of the federal government as suggested by the National Highways Association, or under some form of federal aid as urged by the American Highway Association, brings to mind the conception of the national road, originally suggested by Albert Gallatin and championed by Henry Clay. By an act of Congress, approved by President Jefferson, March 29, 1806, \$30,000 was appropriated toward the survey and construction of this road from a point on the Potomac river, at or near Cumberland, Md., to the Ohio river, at or near a point opposite the town of Steubenville, O. The government appropriated a total of \$6,824,919.33 for this road, which eventually extended from Cumberland to St. Louis. In 1835 arrangements were completed whereby the various states took over the control of this highway between Cumberland and Wheeling, and by 1850 practically all of it had been taken over in this manner.

There does not appear to have been a period in the history of the United States when the subject of roads has been given the consideration

inches. E shows the curbs, composed of rough, flat stones set on edge, with the upper edge flush with the surface.

American Highway Construction.

After 1830 French roads were constructed of macadam, a method introduced in England and Scotland by a Scotchman, John Loudon MacAdam (1756-1836). Macadam, Telford and other forms of stone roads have been constructed in America for a number of years. It is only since the advent of the automobile that there has been

that is true this year. Previous to Dec. 31, 1911, there had been expended for improved highway construction and maintenance by the several states, according to the figures of the office of public roads, \$106,600,789.07. Quoting this same authority, there was \$43,819,138.67 available for this purpose during 1912, and \$45,024,815.74 in 1913. Complete figures for 1914 are not available at this writing, but the American Highway Association supplies the information contained within the accompanying table. It will be un-

STATE MONEY FOR IMPROVED HIGHWAYS.

	Expended Prior to Dec. 31, 1911	Available in 1912	Available in 1913	Available in 1914
Alabama	\$25,332.64	\$270,000	\$264,000	\$700,000
Arizona			250,000	535,724
California	403,300.00	135,000	2,935,000	*
Colorado	1,050,000.00	8,000	550,000	375,000
Connecticut	6,200,572.29	3,652,000	652,000	*
Delaware	132,695.35	30,000	47,811	110,000
Georgia	4,233,500.00	1,543,800	*	*
Idaho	53,000.00	193,000	*	275,000
Illinois	330,000.00	100,000	2,000,000	1,300,000
Iowa		10,000	1,010,000	7,310,000
Kansas	6,500.00	6,500	7,000	*
Kentucky		25,000	25,000	25,000
Louisiana	129,594.16	130,000	*	*
Maine	952,209.75	250,000	2,360,000	1,540,000
Maryland	7,211,000.00	3,370,000	2,170,000	3,700,000
Massachusetts	8,494,942.70	710,000	2,380,000	2,447,315
Michigan	910,000.00	250,000	250,000	4,183,972
Minnesota	369,240.00	490,000	3,481,583	5,672,254
Mississippi				1,720,000
Missouri	850,000.00	80,000	200,000	*
Nevada	20,000.00	20,000	20,000	*
New Hampshire	1,265,483.95	453,000	600,000	*
New Jersey	3,905,000.00	760,000	950,000	750,000
New Mexico	163,055.50	87,820	580,000	587,104
New York	47,121,326.14	23,000,000	10,000,000	6,000,000
North Carolina	13,750.00	5,000	5,000	†5,000,000
North Dakota			*	4,183,972
Ohio	2,015,952.19	680,000	770,000	3,500,000
Oklahoma	5,000.00	5,000	5,000	*
Oregon			*	3,288,000
Pennsylvania	12,500,000.00	4,000,000	4,000,000	3,500,000
Rhode Island	1,913,933.79	940,000	521,000	*
South Carolina				1,000,000
Utah	653,612.33	380,000	325,343	*
Vermont	1,812,962.80	350,000	1,080,000	*
Virginia	996,245.80	310,000	300,000	†2,000,000
Washington	2,261,779.65	1,319,018	5,086,079	*
West Virginia				2,286,557
Wisconsin	600,000.00	250,000	2,500,000	1,230,000
Wyoming	10,000.00			*
Totals	\$106,600,789.07	\$43,819,138	\$45,024,816	\$61,201,016

*No report; †estimated. No figures available respecting Arkansas, Florida, Indiana, Montana, Nebraska, South Dakota, Tennessee or Texas.

derstood, in this connection, that a portion of the funds are carried over from year to year, so that it is impossible to determine the exact amount which has been expended by the several states.

These figures are entirely apart from the national movements, reference to some of which already has been made. The United States government appropriated \$500,000 in 1912, which amount has been expended, or provision has been made for its expenditure, in experimental work in various states. Another appropriation of \$25,000,000 is pending before Congress. The office of public roads is at present co-operating with the American Highway Association and various state officials in some of the southern states, looking toward the adoption of a scientific plan for the future.

Concrete Road Work.

The Lincoln Highway Association expects, this year, to complete the raising of a fund of \$10,000,000 for the construction of a concrete highway across the continent from New York City to San Francisco. The plan appears to involve the active co-operation of states, counties and municipalities, some of which already have undertaken the work of constructing large sections of the proposed road.

Concrete roads may still be regarded somewhat in the nature of an innovation, although they have been laid in a number of sections. Probably that which has seen the longest service is that laid in Bellefontaine, O., in 1893 and 1894. About 2000 square yards was built in blocks five feet square with joints at right angles and parallel to the axes of the streets. The bottom four inches was constructed of an unscreened gravel concrete of a 1-6 mixture and the top of 1-1 mixture.

Writing regarding this pavement, under date of Sept. 19, 1913, Clair A. Inskip, city engineer of Bellefontaine, says that there has been but very little wear on these streets in the past 20 years, except along the longitudinal joints, which have worn in ruts and which have been the source of all repair work. He adds that this feature might easily have been avoided by placing the blocks at angles of, say, 45 degrees with the centre line of the streets. An accompanying illustration shows the condition of the pavement at that time. It has been subjected to the heaviest traffic of a city of 10,000 inhabitants.

Little attempt has been made herein to offer more than a suggestion as to the interest that is being taken in the matter of improved highways, and some of the plans now under way looking toward a more careful study of a problem which has presented itself since the earliest days

of the world's history. The automobile industry has every reason to be proud of the important part it has played in this matter. The old national pike of 1806 was abandoned by the United States government because of the growing importance of the railroad as a means for serving commerce. The automobile industry, both with reference to the use of passenger cars and motor trucks, has revived interest in highway transportation, as a means for still further reducing the cost of haulage and travel, and it is beginning to be appreciated that there is a science in road making as well as a science of railroad engineering.

SPECIAL BOSCH PRIZES.

Company Sets Aside \$1300 for Ignition Awards at Forthcoming 500-Mile Race.

In keeping with the practise followed by the Bosch Magneto Company, New York City, for a number of years past, that concern has set aside \$1300 to be paid as special prizes as a result of the forthcoming international sweepstakes 500-mile race on the Indianapolis motor speedway, Memorial Day. Past experience has been such as to indicate to the company that these prizes will be won.

The awards are conditional upon the use of Bosch magnetos and plugs. In case the winning machine uses a magneto of this make the driver will receive \$500, in addition to the regular speedway prize. The driver of the second car to finish will receive \$300 and the driver in third place \$200. If these cars are equipped with Bosch plugs the awards will be \$100 in each instance, in addition to all other prizes won.

ITS BIGGEST YEAR.

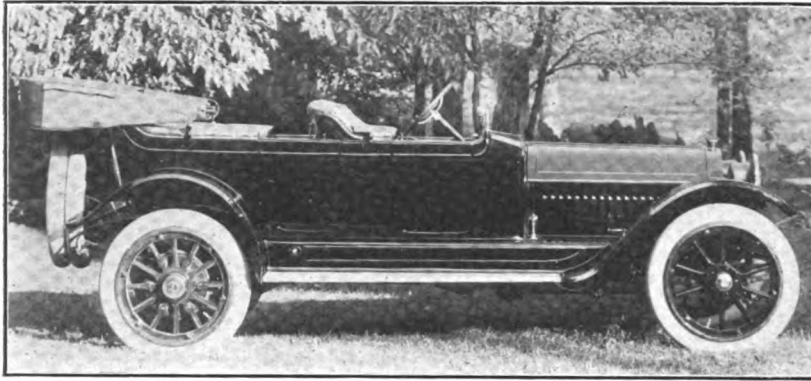
Lozier Motor Company Reports That Sales Have Set an Entirely New Record.

As an indication of business conditions throughout the country, it is of interest to note the report of President J. M. Gilbert of the Lozier Motor Company, Detroit, who states that up to April 1 the company had produced and sold more Lozier cars in 1914 than during the first six months of 1913. In addition Mr. Gilbert says:

In February we established the highest record for sales since we began the manufacture of automobiles. March sales exceeded February by a wide margin. Our March sales were actually 142 per cent. ahead of the sales in the corresponding period of a year ago.

FEATURES OF NEW SERIES D HOWARD CAR.

FOR the season of 1914 the Lexington-Howard Company, Connerville, Ind., will market, in addition to a four-cylinder Lexington car,



Series D Howard, a Five-Passenger Touring Car, Completely Equipped and Having Many Refinements Making for Economical Operation.

the series D Howard, a six-cylinder chassis, to which one type of body will be fitted, a five-passenger touring car. The new machine presents many interesting mechanical details, as well as those providing comfort and convenience. The Howard was designed to meet the demand for a high grade, family car, having ample power to meet the requirements of all kinds of service and capable of being maintained at a minimum of expense.

The motor employed is known as the model Six-C Continental, rated at 60 horsepower by the maker, and combined with it is the clutch, gear-set and electric motor starter. A three point suspension is employed, the forward points being extensions of the crankcase casting, while the rear is mounted in a bronze lined bearing lubricated by a grease cup.

The cylinders are cast in blocks of three, have a bore of 4.125 inches and stroke of 5.25, and the output according to the S. A. E. formula is 40.9, but tests have shown that this figure is very conservative. All valves are located on the right and are made of two metals, the stems being of carbon steel and the heads of nickel. The head diameter is 1.3125 inches and that of the stem .40625 inch. The valve mechanism is enclosed, two plates being utilized. Accessibility is a feature of the design.

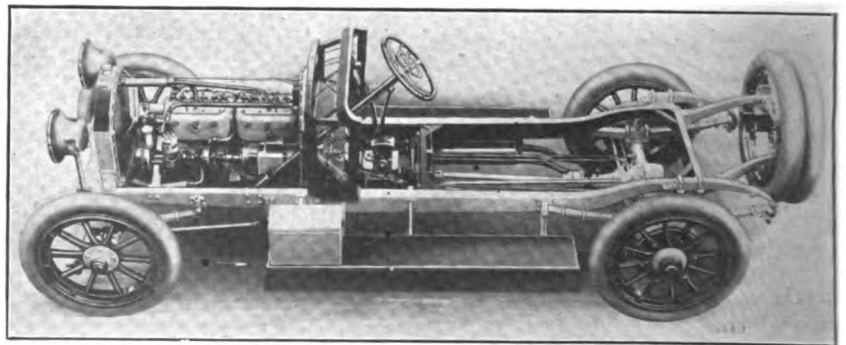
The crankshaft is a 40 per cent. carbon steel, and the dimensions of the three bearings are as follows: Front, two by 2.8125 inches; centre, two by 3.5; rear, 2.25 by 3.8125.

The crankpins are two inches in diameter. The camshaft diameter is 1.9375 inches and is carried in three bearings of the following dimensions: Front, 2.25 by 2.9375 inches; centre, 2.25 by 1.625; rear, 1.875 by 1.375. All bearing surfaces of the crankshaft, camshaft and connecting rods are composed of nickel babbitt, hand scraped. The connecting rod bearings are adjustable for wear by utilizing varying thicknesses of punched sheet steel shims. The timing gearset is composed of three helical gears, these being employed for the crankshaft, camshaft and magneto drive. The flywheel is 17.25 inches in diameter, secured to the crankshaft by six steel bolts. After assembly the flywheel and camshaft are balanced on a running balance machine.

Pistons Carefully Fitted.

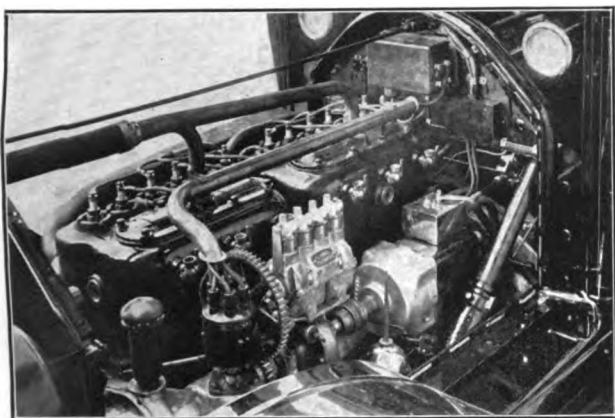
Three diagonally split eccentric rings, .25 inch wide, ground on both sides, are fitted above the chrome nickel steel wristpin, which is of the fixed type and has bearings of 1.21875 by 1.875 inches in the phosphor bronze bushing in the upper ends of the connecting rods. The piston is 5.625 inches and its outside is provided with an oil groove, preventing excess lubricant working into the combustion chamber. The motors are run under belt power to obtain accurately seating rings.

The aluminum alloy crankcase is a two-piece



Chassis of the Series D Howard, Equipped with a Six-Cylinder Motor, Electric Lighting and Motor Starting—Note the Method of Carrying Spare Casings.

construction, the lower section forming the oil reservoir and being easily removable. An efficient type of automatic carburetor is employed



Left Hand Side of Howard Motor, Showing Power Driven Tire Pump, Motor-Generator and the Compact Grouping of Cylinders.

and the fuel supply is by pressure, a small reciprocating air pump being located in the crankcase of the motor. The fuel tank is mounted under the front seat and has a capacity of 18.75 gallons. The supply is registered by a dash indicator.

The ignition system includes a Bosch true high-tension magneto and the Atwater-Kent automatic advance system of battery ignition. A feature of the cooling system is the use of removable covers, permitting access to the water jackets of the motor. The Fedders radiator is attached to the front cross frame member in such manner as to eliminate road shocks and frame stresses.

Efficient Lubrication.

Lubrication is by a combination force feed and splash system and the height of the oil in the crankcase is maintained at a constant level. The lubricant is circulated by a plunger pump directly to the main bearings, overflowing into a series of troughs into which the connecting rods dip, lubricating the pistons, connecting rods, camshaft, timing gears, etc., by splash. The surplus lubricant drains back to the reservoir and before being circulated is strained.

A 14-inch diameter, leather faced cone clutch is used, three inches wide and having a 12-degree taper. One of the qualities of the design emphasized is its light weight at the rim, reducing to a minimum any tendency to spin and making changes of gears easy. The clutch shaft is mounted in annular ball bearings and the throw-out member is also ball bearing. Six small springs, equally spaced, are employed to compen-

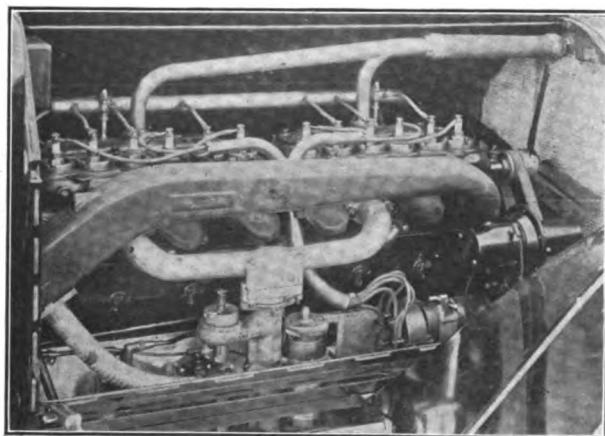
sate for wear. Twelve flat steel springs are inserted under the clutch facing, these being in slots milled in the face of the aluminum cone, and it is stated that the combined strength of the 12 springs is slightly less than the six retaining members, obtaining an ideal clutch action. Each leather is ground accurately to size in a special machine. An adjustable clutch brake is also provided. Accessibility of the clutch and its components is a feature of the design.

The gearset is a three forward speed, selective type, designed by the company's engineers, and the gears are of chrome vanadium steel, heat treated, and enclosed in an oil proof aluminum casing. All gears are of ample diameter with .875-inch face and five pitch. They are carried on large shafts with four splines milled from solid, and mounted in oversize imported annular ball bearings. The shaft centres are distanced 4.60 inches.

Special H Slot Used.

Drive is through a Spicer shaft with a universal joint at each end and companion flanges are fitted to each joint to make for rapid disassembly. The gearshift set is mounted directly on the top of the transmission, forming the cover, and the shifting fingers extend directly into the forks. By removing four bolts the construction can be displaced easily. Shifting into the reverse when changing gears is prevented by the use of a specially designed H slot. It is stated that the arrangement is automatic in its action and eliminates thumb latches or similar devices.

The rear axle is a Timken floating design, a one-piece pressed steel housing with the bevel gear and pinion mounted as a unit. The driving dogs are forged integral with the axle shafts, then milled, heat treated and ground. The front



Valve Side of Howard Motor, Utilizing the Moore Multiple Exhaust, Which Increases Efficiency.

axle is also a Timken, of the I beam section type, and all wearing parts are bushed. Timken roller bearings are utilized for the wheel mountings.

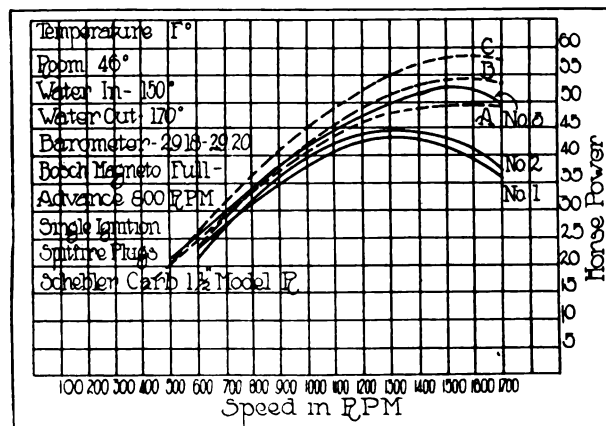


Chart Showing Curves from Test of Moore Multiple Exhaust System: Curves 1 and 2 Deplet Results with Regular Equipment; Curve 3, the Moore System—Dotted Curves A and B Deplet Results Obtained with Standard and Multiple Manifold Without Muffler, and C with Carburetor Adjusted to Suit—The Temperature of the Water In Was 150 Degrees Fahrenheit, and 170 Out.

The brakes are ample in size to meet the requirements of all service, the drums having a diameter of 5.5 inches and face of 2.5. The service members are of the contracting type and the emergency, expanding. The wheels are designed by the company and are equipped with 36 by 4.5-inch tires and Firestone quick detachable demountable rims.

The springs receive careful consideration and provide easy riding, as well as durable qualities. The front members are semi-elliptic, 38 inches long and two wide, while the three-quarter elliptic rear members are 52 inches long and two wide. All spring eyes are bronze bushed, reamed to size and fitted with hardened and ground bolts with integral grease cups.

Novel Tire Carrier.

The frame members are of pressed steel made from special material, 4.75 inches deep with three-inch flanges at offset, tapering to 1.5 inches at the rear end. The frame is narrowed in front to provide a short turning radius and has the usual kick-up at the rear. The method of mounting the spare tires is novel and is considered in detail in connection with the description of the Lexington car, made by the same company, elsewhere in this issue.

The steering gear is of the worm and gear type, provided with an adjustable ball thrust bearing on each side of the worm, and other adjustments can be made to compensate for wear. The 18-inch wheel is notched, and the control levers are mounted with friction locks. When

the Atwater-Kent ignition system is being utilized, the spark lever is not employed, but upon switching to the magneto, the lever permits of control of the spark.

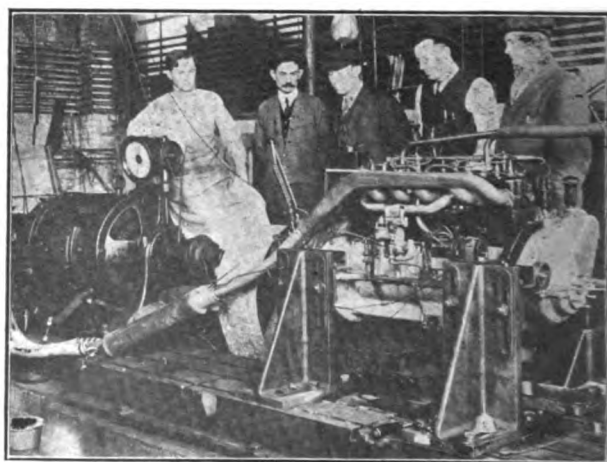
The lighting and motor starting system is a special Jesco, a combined unit operating at six volts. Energy of the electric motor is imparted to the crankshaft by a silent chain, and an automatic clutch prevents any injury in the event of a back fire. The wiring system is very simple and the equipment easily cared for.

All controls are convenient to the driver. On the instrument board are mounted the speedometer, air gauge, ammeter, lighting and ignition switches, priming button and instrument lamp. The motor starter is operated by a foot button at the right of the steering column. The accelerator is unique, hemispherical in shape, and permits of changing the position of the foot.

The body design is very attractive and the doors are large, with concealed hinges. Ebonized cap moldings match the ebony finished dash and instrument board. Tool pockets are fitted into the upholstery under the cowl, and nothing but the best curled hair and genuine hand buffed long grain leather is used. The Turkish cushions are very deep and comfortable. The equipment is most complete, including top and cover, windshield, etc. The wheelbase is 130 inches and weight complete 3900 pounds.

Moore Multiple Exhaust System.

The motors used by the Lexington-Howard Company are equipped with the Moore multiple exhaust system, which consists of a manifold di-



Showing the Howard Six-Cylinder Motor with Moore Multiple Exhaust System Being Tested at Wheeler & Schebler Laboratory.

vided in such manner that no two cylinders exhaust into the same compartment at the same time. Two tubes and two mufflers are utilized.

That a motor equipped with this system will develop considerably more power than when fitted with conventional manifolds and mufflers, was demonstrated in tests conducted by Chief Engineer J. C. Moore of the company in the laboratories of Wheeler & Schebler, Indianapolis, Ind. The results of these tests are given in an accompanying chart. They were continued over a period of two weeks, and both four and six-cylinder motors were utilized, it being found that the former showed an increase in efficiency with the Moore system of 10 per cent., while the larger engine gained 22.8 per cent.

It was found that with a standard manifold, tube and muffler, using a 2.25-inch pipe instead of a two, and with a 7.5 by 20-inch muffler instead of a seven by 24, the six-cylinder Lexington-Howard motor attained its maximum at 1400 revolutions a minute when it was developing 44.3 horsepower. With the Moore system 50 horsepower was obtained at the same number of revolutions, but the curve climbed steadily from that point on, until the motor developed 52.2 at 1600 revolutions a minute. The dimensions of the tubes were 1.625 inches, those of the muffler, 5 by 21.

Fuel Economy Obtained.

The carburetion results are interesting. With the motor equipped with a single manifold, tube and muffler, it was found that an 1.25-inch carburetor, No. 6 needle, No. 21 air spring and a .5-inch venturi tube were necessary to obtain the best results. With the Moore system the same size of carburetor was utilized, but maximum efficiency was secured with a No. 8 needle, No. 17 air spring and a .625-inch venturi tube.

Tests were also conducted without mufflers. With the standard single exhaust manifold it was noted that the six-cylinder engine developed its maximum of 54 horsepower at 1600 revolutions a minute. With the Moore manifold exhaust the motor developed 58 horsepower at the same number of revolutions. During all of the tests the barometric readings were approximately the same, the same carburetor and ignition system were used and the water temperatures, in and out, were about equal in all cases. The tests of the six-cylinder motor lasted about a week.

Gain in Horsepower.

Tests with the four-cylinder Lexington-Howard motor showed similar increase over normal conditions. The engine equipped with a single manifold, tube and muffler showed its maximum efficiency at 1600 revolutions a minute and developed 31.3 horsepower. When the Moore multiple exhaust system was substituted, the motor developed 34.3 horsepower at 1500 revolutions a

minute, a gain of 3.2 at a slower motor speed. The motor was also run without mufflers and with the conventional manifold developed 33.8 horsepower at 1600 revolutions, as against 35.2 at 1600 when the Moore exhaust manifold was used. As in the tests with the six-cylinder engine, the barometer readings were approximately the same and similar ignition and carburetor were used. The temperature of the water, in and out, was about equal in all cases.

These tests are interesting to the mechanical expert and those technically familiar with carburetion, in that they show the possibility of obtaining greater efficiency from the motor. The tests also have a bearing upon the subject of back pressure. From a motorist's standpoint these tests indicate the possibility of fuel economy, in that more power is obtained.

ADDS NEW DEPARTMENT.

Pyrene Company Finds It Necessary to Devote Special Attention to Automobiles.

The announcement, which was made public a few months ago, that the leading fire insurance companies had granted a reduction of 15 per cent. in their rates wherever the automobile or motor truck was equipped with an approved fire extinguisher, has resulted in a most gratifying increase in the demand for the product of the Pyrene Company, New York City, for which the Pyrene Company of New England, 176 Federal street, Boston, Mass., is New England representative. It appears upon investigation that the Pyrene extinguisher is the only approved equipment which meets the needs of the automobile user.

In view of this situation the company has found it desirable to establish a special automobile department, which will act in the nature of a general information bureau and counsel on all matters pertaining to automobile fire insurance. Owners of both passenger cars and business wagons are cordially invited to make use of this service, which is furnished without charge. C. Louis Allen, for the past year New York manager of the Service Recorder Company, has been placed in charge as manager.

It is understood that the Hoosier Motor Club of Indianapolis will have a clubhouse in the country this summer. Some very attractive offers have been received by the club recently from organizations and individuals who have desirable quarters that could be used to advantage. It is thought one of these will be accepted.

NEW INSURANCE RATES NOW IN EFFECT.

Automobile Underwriters' Conference Adopts Fire and Theft Schedules for West and South and Makes Changes in Non-Valued Policies for Eastern States.

AT A meeting of the Automobile Underwriters' Conference in New York City, April 10, action was taken, as a result of which cars in the hands of dealers in the states of the West, Southwest and Southeast, may no longer be insured for fire and theft at pleasure car rates, even where the short rate cancellation is provided. The conference also adopted new schedules for the Western and Southeastern departments, the former affecting the states of Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Kansas, Nebraska, North Dakota, South Dakota, Wyoming, Colorado and New Mexico, and the latter the states of Virginia North Carolina, South Carolina, Georgia, Florida, Alabama, Mis-

writers' Laboratories of the National Board of Underwriters is carried on the automobile. This provision actually went into effect last fall, following the action taken by the Automobile Insurance Company of Hartford, Conn., which is not a member of the Automobile Underwriters' Conference. Thus far the only one quart capacity pump type extinguisher that has been approved by the board mentioned above is the Pyrene, made by the Pyrene Manufacturing Company, New York City.

The new schedule follows:

WESTERN AUTOMOBILE SCHEDULE.

On gasoline power driven private pleasure motor cars and commercial vehicles, such as trucks, delivery wagons, based on manufacturers' original list prices:

AMOUNT FOR INSURANCE Including Equipment But Not Extra Bodies Subject to "Indemnities and Limits"	Original List Price of Automobile, when New (Not Second Hand), Excluding Cost of Additional Equipment and Extra Bodies												
	6500 and Up	5500 to 6499	4500 to 5499	3500 to 4499	3000 to 3499	2500 to 2999	2000 to 2499	1500 to 1999	1000 to 1499	1100 to 1299	900 to 1099	700 to 899	
	A	B	C	D	E	F	G	H	J	K	L	M	
6500 and up	1½												
5500 to 6499	1½	1½											
4750 to 5499	1½	1½	1½										
4000 to 4749	1½	1½	1½	1½									
3500 to 3999	2	1½	1½	1½	2								
3000 to 3499	2½	2	1½	1½	2	2							
2750 to 2999		2½	2	1½	2	2							
2500 to 2749			2½	2	2½	2	2						
2250 to 2499				2½	2½	2	2						
2000 to 2249					2½	2½	2	2					
1800 to 1999						2½	2½	2	2				
1600 to 1799							2½	2½	2				
1400 to 1599								2½	2½	2			
1200 to 1399									2½	2½	2½		
1000 to 1199										2½	2½	2½	
800 to 999											2½	2½	2½
700 to 799												2½	2½
600 to 699													2½
500 to 599													2½

All cars listed at less than \$700 take a rate of 2½%, irrespective of the amount insured, but the minimum premium for full term policy shall be \$12.50, or with theft and valued policy clauses eliminated, the minimum premium shall be \$10.00.

First Section of Rate Card Applying in New England, Middle Department and Metropolitan District.

Mississippi, Louisiana, Arkansas and Oklahoma. These went into effect April 20.

No action was taken by the conference with reference to changing the rates for New England and the Middle department, including the Metropolitan district, but it did revise rates for the non-valued form of policy. The schedule for the New England and Middle Atlantic States was adopted by this conference about a year ago, and is presented herewith, as well as the changes adopted at the recent meeting.

A noticeable feature of the new schedule is the provision for a reduction of 15 per cent. on the premium if a device approved by the Under-

Limits of amount of insurance include equipment, but not additional bodies. See additional equipment and additional bodies rules below.....

This and Next Year Models—Insure for not to exceed actual cost or less than 50% of original list price.....

Last Year Models—Class A, amount of insurance at option of company; Class B, not more than 70% of original list price; Class C, not more than 60% of original list price.....

Year Before Last Models—Class A, amount of insurance at option of company; Class B, not more than 50% of original list price; Class C, not more than 40% of original list price.....

Minimum premium.....

Three-Year-Old and Older Models—Class A, amount of insurance at option of company; Class B, not more than 30% of original list price; Class C, not more than 20% of original list price.....

Note—Exceptional cases may arise where car is well owned and is in very good physical condition where limits on "three-year-old and older models" are not sufficient. In such case refer to company, with full particulars, when slightly increased amounts may be allowed, but in no case to exceed 40 per cent. of original list price.

Reduction—A reduction of 50c from above rates will be allowed for attachment of "non-valued ex-theft and automatic reinstatement" endorsement by use of clause furnished you for that purpose.

Cars Listing Less Than \$700.

	Rate	Minimum premium
Fire and theft.....	3½%	\$12.50
This and next year—		
Fire only.....	1½%	7.50
Fire and theft.....	3½%	12.50
Last year and older—Fire only.....	3%	10.00

Electric Automobiles.

Rate for full form of fire and theft floater (all models) 1 1/4 %
 Rate for restricted form 1 %

Dealers' Automobiles.

Fire & theft Restricted floater

New gasoline automobiles—
 List price \$3500 or over 2 1/4 %
 List price \$1500 to \$3499 2 1/2 %
 List price less than \$1500 2 3/4 %
 Electric automobiles 2 %
 Steam automobiles 3 %

No risk accepted where boiler and burner are located in rear of dashboard. Second-hand cars, 1 per cent. additional rate must be charged. Pro rata cancellation allowed with a minimum charge of \$1.

SOUTHEASTERN AUTOMOBILE SCHEDULE.

Rates for the full form of policy, gasoline, pleasure and commercial type cars:

	Class		
	A.	B.	C.
Original list price of automobiles when new, excluding cost of additional equipment and extra bodies	\$3500 and over	\$1500 to \$3499	\$1499 and less

This and Next Year Models—Insure for not more than actual cost 2 1/2 % 2 1/2 % 2 1/2 %
 Last Year Models—Insure Class A for not more than 80%, Class B for not more than 60% and Class C for not more than 50% of list price 2 1/2 % 3 % 3 %
 Year Before Last Models—Insure Class A for not more than 70%, Class B for not more than 50% and Class C for not more than 40% of list price 3 % 3 1/4 % 3 1/2 %

Three-Year-Old Models—Insure Class A for not more than 60%, Class B for not more than 30% and Class C for not more than 20% of list price 3 1/4 % 4 % 5 %

Note—Second-hand cars, charge 1/2 per cent. in addition to above rates.

Electric Cars—Models of all years, 2 per cent.; second-hand cars, charge 1/2 per cent. in addition to above rate. Maximum insurable amounts at the option of underwriter.

Taxicabs, Livery and Renting Automobiles—All risks of this kind must be submitted to the home office. If approved, will be written at not less than 1 per cent. in addition to schedule rates, subject to the following indorsement:

"In consideration of \$..... additional premium, permission is hereby granted for the automobile herein insured to be used for carrying passengers for a compensation, provided it is under the personal supervision and guidance of the assured or a chauffeur in his employ while being so used".

Rates for the Restricted Form of Policy.

(The theft and reinstatement features excluded from the full policy by attaching the indorsement provided for that purpose.)

Electric Automobiles, Taxicabs, Livery and Renting Automobiles, Gasoline Pleasure and Commercial Automobiles—A reduction of 1/2 per cent. allowed from the rates for the full form of policy.

Minimum Premium.

For the full form of policy \$12.50
 For the restricted form of policy 10.00

Dealers' Automobiles.

Rates for full form of policy:

New gasoline cars—
 Listing for \$3500 and over 2 1/4 %
 Listing for \$1500 to \$3499 3 %
 Listing for \$1499 and less 3 1/4 %
 New electric automobiles, all models 2 %
 New steam automobiles, all models 3 1/2 %
 (Subject to 1 1/4 % reduction if boiler and burner are located in front of dashboard.)

For second-hand and rented cars charge 1 per cent. in addition to above rates. Pro rata cancellation allowed with a minimum charge of \$1 except on cars list-

ing for \$1499 and less the minimum charge is 50c. Amounts of insurance at option of underwriter.

Rates for the Restricted Form of Policy—A reduction of 1/2 per cent. is allowed from the above dealers' rate for the elimination from the full policy of the theft and reinstatement features. Minimum premiums same as above.

Fire Extinguishing Devices—A reduction of 15 per cent. of the premium is allowed if a device approved by the Underwriters' Laboratories of the National Board of Fire Underwriters is carried on the automobile and an indorsement provided for that purpose is attached to the policy. This reduction, however, is not allowed on additional premiums for the theft full coverage, collision sustained and property damage.

European Privilege—At an additional rate of 1 1/2 per cent. policies may be extended to cover a European trip under the form of indorsements provided for that purpose. If the risk of the transatlantic trip, going and returning, be eliminated, this privilege can be granted without extra charge.

SCHEDULE FOR EASTERN STATES.

The schedule for the eastern states is presented in detail in the accompanying charts, in explanation of which it may be stated that all

CLASS No. 2

AMOUNT FOR INSURANCE Including Equipment But Not Extra Bodies Subject to "Instructions and Limits"	Original List Price of Automobile, when New (Not Second Hand), Excluding Cost of Additional Equipment and Extra Bodies												
	6500 and up	5500 to 6499	4500 to 5499	3500 to 4499	3000 to 2999	2500 to 2499	2000 to 1999	1500 to 1499	1300 to 1299	1100 to 1099	900 to 899	700 to 699	
	A	B	C	D	E	F	G	H	J	K	L	M	
6500 and up	2 1/2												
5500 to 6499	2 1/2	2 1/2											
4500 to 5499	2 1/2	2 1/2	2 1/2										
3500 to 4499	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2								
3250 to 3499	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2							
3000 to 3249	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2						
2750 to 2999	3	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2					
2500 to 2749	3 1/2	3	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2					
2250 to 2499	3 1/2	3 1/2	3	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2					
2000 to 2249	4	3 1/2	3 1/2	3	2 1/2	2 1/2	2 1/2	2 1/2					
1750 to 1999	4	3 1/2	3 1/2	3 1/2	3 1/2	2 1/2	2 1/2	2 1/2	3 1/2				
1400 to 1749	4 1/2	4	3 1/2	3 1/2	3 1/2	3	2 1/2	2 1/2	3 1/2	3 1/2			
1200 to 1399			4 1/2	4	4	3 1/2	3	2 1/2	3 1/2	3 1/2	3 1/2		
1000 to 1199				4 1/2	4 1/2	3 1/2	3 1/2	3	3 1/2	3 1/2	3 1/2	3 1/2	
800 to 999					4 1/2	4	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2
600 to 799						4 1/2	4 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2
500 to 599							4 1/2	4 1/2	4 1/2	3 1/2	3 1/2	3 1/2	3 1/2
400 to 499								4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2

All cars listed at less than \$700 take a rate of 3 1/2 %, irrespective of the amount insured, but the minimum premium for full form of policy shall be \$12.50, or with theft and valued policy clauses eliminated, the minimum premium shall be \$10.00.

Second Section of Rate Card Which Is in Force in the Eastern States.

gasoline automobiles are divided for the purpose of rating into two general classes. Class No. 1 includes columns A, B, C and D, cars of last year, this year and next year models; E, F, G and H, cars of this year and next year, and J, K, L, M and cars listed at less than \$700, cars of this year and next year, in hands of original owners. Class No. 2 includes all automobiles not coming within the definition of class No. 1. The remainder of the schedule follows:

Instructions and Limits.

Amounts to be insured must not be more than actual value and be limited as follows: Columns A, B, C and D, cars of this year and next year models for not less than 50% of original list price. Columns E, F, G and H, cars of this year and next year models for not less than 50% of original list price; cars of last year models for not more than 80% of original list price; cars of year before last models for not more than 60% of original list price; no policy on cars of models earlier than the above shall

be issued for an amount in excess of 40% of original list price. Columns J, K, L and M, cars of this year and next year models for not less than 50% of original list price; cars of last year models for not more than 70% of the original list price; cars of year before last models for not more than 50% of original list price; no policy on cars of models earlier than the above shall be issued for an amount in excess of 40% of original price.

Additional Equipment.

In addition to the amounts fixed by these limits, additional equipment may be insured for not exceeding \$300 on cars in columns A to H inclusive, and \$200 on any other cars by means of the following form of indorsement:

"In consideration of an additional premium of \$....., the sum insured under this policy is increased by \$..... to cover the value of additional equipment not furnished with the car by the manufacturer at its list price; all other terms and conditions remaining unchanged".

Additional premium for this additional amount shall be charged for at the same rate as charged in the body of the policy. The rate on the policy to be computed without reference to this rider.

Electric Automobiles.

Rate for all models $1\frac{1}{2}\%$. A reduction of $\frac{1}{4}$ of 1% for the elimination of theft and valued policy clauses is permitted using the indorsement provided for that purpose. Amount of insurance at discretion of company.

Steam Automobiles.

Cars of this year and next year models, rate not less than 3%. Cars of last year models, rate not less than $3\frac{1}{4}\%$. A reduction of $\frac{1}{4}$ of 1% is permitted if boiler and burner are located in front of dashboard. A reduction of $\frac{1}{4}$ of 1% is permitted for the elimination of theft and valued policy clauses using the indorsement provided for that purpose. Amount of insurance at discretion of company.

Livery and Renting Automobiles.

All applications covering cars used for livery and for renting purposes must be submitted to this office. If approved they will be written subject to the following clause, not less than 1% additional being charged:

"In consideration of \$..... additional premium permission is hereby granted for the automobile herein insured to be used for carrying passengers for a compensation, provided it is under the personal supervision and guidance of the insured or a chauffeur in his employ while being so used".

Additional Bodies.

In determining the original list price of automobiles having more than one body, the sum of the cost of the chassis and the higher priced body shall be taken as the original list price and the amount of insurance for the purpose of arriving at the rate to be charged shall be the amount insured on the chassis and the higher priced body. No change to be made in the classification of the car during the policy period.

In the case of an automobile equipped with an extra body or bodies, a specific amount must be applied to the chassis and equipment and to each body, the same rate being charged on the extra body or bodies as is charged on the automobile. The following clause to be used:

"In consideration of an additional premium of \$....., on and after date this policy shall cover an additional amount of \$....., which shall apply only on extra body used in connection with the automobile insured hereunder, and the insurance on the chassis and original body shall be divided as follows: \$..... on chassis and equipment; \$..... on body".

All other terms and conditions of this policy remaining unchanged.

Dealers' Automobiles.

On new gasoline cars charge $2\frac{1}{4}\%$ in columns A to D; $2\frac{1}{2}\%$ in columns E to H, and $2\frac{3}{4}\%$ for all others. On new electric cars charge 2% for all models.

On new steam cars charge $3\frac{1}{4}\%$ for all models, except where boiler and burner are located in front of dashboard, where a rate of 3% shall apply.

On all second-hand cars 1% additional rate must be charged.

Pro rata cancellation allowed with a minimum charge of \$1, except that the minimum charge on new cars listed at less than \$1500 shall be 50c.

Amounts insured at option of underwriters.

Note—Automobiles in the hands of dealers may be

written under the ordinary form of policy at rates provided for private pleasure cars subject to cancellation on a short rate basis only, except pro rata cancellation may be allowed when a new policy is issued on the same car.

A reduction of $\frac{1}{4}$ of 1% will be allowed for the elimination of theft and valued policy clauses, but in all cases the minimum charge of \$1 and 50c shall apply as above indicated.

Commercial Automobiles.

Shall be written for amounts, and at the scheduled rates, as provided for private pleasure automobiles.

Second-Hand Cars.

Cars in hands of other than the original purchaser of the car when new shall in no case be insured for an amount in excess of the cost of the same to the insured.

REVISED NON-VALUED POLICY RATES.

The revised schedule of rates for non-valued form of policy, excluding theft and reinstatement clauses, applying to New England, the Middle Department and Metropolitan District, in effect April 20, is as follows:

Gasoline Pleasure Cars.

	Per Cent.
Cars of this and next year models—	
Insured for not less than 80% of list price.....	$1\frac{1}{2}$
Cars of last year models—	
Listing \$3500 and over.....	$1\frac{1}{4}$
Listing \$1500 to \$3499, insured for not exceeding 80% of list price.....	$1\frac{1}{4}$
Listing under \$1500, insured for not exceeding 70% of list price.....	2
Cars of year before last models—	
Listing \$3500 and over.....	2
Listing \$1500 to \$3499, insured for not exceeding 60% of list price.....	$2\frac{1}{4}$
Listing under \$1500, insured for not exceeding 50% of list price.....	$2\frac{1}{2}$
Cars of models three years old—	
Listing \$3500 and over.....	3
Listing \$1500 to \$3499, insured for not exceeding 40% of list price.....	3
Listing under \$1500, insured for not exceeding 40% of list price.....	$3\frac{1}{2}$
Four-year-old models and older—	
Minimum rate, insured for not exceeding 40% of list price	$4\frac{1}{2}$

Electric Cars.

All models $1\frac{1}{4}$

Commercial Trucks.

Of not less than one ton capacity—

This and next year models..... $1\frac{1}{4}$
 Cars rented, leased or used for carrying passengers for compensation—charge 1% in addition to above rates.
 Minimum premium, \$5.

At the April meeting of the Automobile Dealers' Association in New York City, the Marmon Company of New York was admitted to membership, this concern being represented on the board by Frank G. Carrie. The Studebaker Company's membership was changed to the Phelps Motor Car Corporation, represented by George Phelps, and the Carl H. Page Company to the Chalmers Motor Company of New York. George H. Stowe. S. S. Toback replaced A. M. Day, resigned, as representative for the A. Eliott Ranney Company, and George H. Smith replaced John Clark for the Peerless Motor Car Company of New York.

GENERAL NEWS OF THE INDUSTRY.

Crude Oil Prices and Their Effect upon the Cost of Gasoline and Motor Lubricants--- Well Known Concerns Planning to Materially Increase Their Capital.

WHAT effect, if any, the reduction in the market price of various grades of crude petroleum will have on the cost of gasoline and motor oils, is a subject which will interest automobile owners and users. Since the middle of the month there has been a decline of from five to 30 cents a barrel on practically all grades. Kansas and Oklahoma crudes made the first reductions, dropping from \$1.05 to 80 cents, in stages of five cents each. Later, these recovered five cents, and at this writing were selling at 85. Pennsylvania crude, which was selling at \$2.50 a barrel previous to April 17, dropped 10 cents that day, and has suffered two additional drops of 10 cents each since that time, now being quoted at \$2.20.

The reason for the reduction in Kansas and Oklahoma crudes is given as the increased production from newly located wells. One authority states that between 1000 and 1200 wells a month have been driven in those two states during the past year, previous to March 1. This rate is now beginning to fall off, and it is anticipated that it will be between 600 and 700 wells a month after May 1. However, a report from Gainesville, Tex., states that new oil fields have been discovered at Dexter, northeast of that city, and that citizens have formed a stock company and completed arrangements for sinking a large number of wells.

As is well known, the price of gasoline in 50-gallon lots or more has been reduced in the East from 17 to 15 cents a gallon. This was accomplished by two reductions of one cent each. In St. Louis there have been five reductions, bringing the price of the Indiana Standard Oil Company's product down to 13 cents. Competition is said to be very keen in that district and price changes were found to be necessary in order to hold the business.

TO INCREASE ITS CAPITAL.

Stockholders of Vacuum Oil Company to Consider Addition of \$10,000,000.

Stockholders of the Vacuum Oil Company, Rochester, N. Y., may have opportunity to subscribe for \$10,000,000 additional stock during the current year, officials of that concern having a

plan for increasing the capital from \$15,000,000 to \$25,000,000. It is stated that the new issue would greatly assist in the expansion of the business and bring the capital to a figure more nearly representing the net assets.

The capital was increased from \$2,500,000 to \$15,000,000 in February, 1912. The company owns oil plants in Rochester and Olean, N. Y., and Bayonne, N. J., and has spent large sums in extending its refining and marketing facilities in Russia, Austria-Hungary, Germany and Australia. The greater part of last year's earnings is said to have been turned back into the property, although two semi-annual dividends of \$3 were paid, and another of the same amount has been declared, payable in May. The balance sheet, as of Dec. 31, 1912 and 1913, shows the following:

Assets.		
	1913	1912
Real estate, machines.....	\$3,501,109	\$3,138,907
Manufacturing, merchandise, material and stock in process	7,008,885	4,967,604
Cash and debts receivable.....	12,544,054	12,469,420
Stocks in other companies.....	11,430,136	11,422,126
Total.....	\$34,484,184	\$31,998,057
Liabilities.		
Capital stock	\$15,000,000	\$15,000,000
Insurance reserve	100,840	.....
Accounts payable, floating in- debtedness	2,232,295	2,322,781
Surplus	17,151,049	14,675,276
Total.....	\$34,484,184	\$31,998,057

KELLY-SPRINGFIELD TIRE PLAN.

Special Meeting of Stockholders to Consider New Preferred Issues.

A special meeting of the stockholders of the Kelly-Springfield Tire Company, New York City, has been called for May 4, at the offices of the company, 15 Exchange place, Jersey City, N. J., to consider the plan proposed by the directors for retiring the four per cent. income debenture bonds of the company, by issuing therefor, par value, of six per cent. cumulative preferred stock, on the basis of one share of said stock of the par value of \$100 for each \$100 face value of said income debenture bonds.

The plan further contemplates the funding of the 78.5 per cent. of dividends accumulated upon the present issue of six per cent. preferred stock, by the issuance of seven per cent. cumulative

preferred stock, each share of said seven per cent. cumulative preferred stock, if authorized, to be convertible into one share of common stock, at the option of the holder thereof, at any time within 10 years after July 1, 1914.

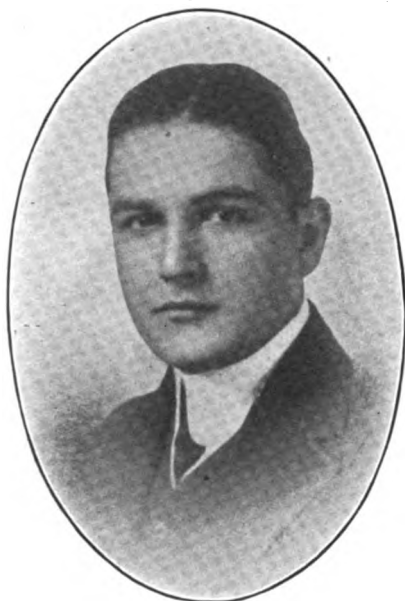
The plan involves increasing the authorized capital stock from \$5,149,500 to \$10,299,000, divided as follows: Common stock, \$5,029,900; six per cent. cumulative preferred, \$4,239,200; seven per cent. cumulative preferred \$1,029,900.

BECOMES ADVERTISING MANAGER.

Joseph M. Kraus Will Take Charge of Publicity Campaign for Partin-Palmer Cars.

C. C. Darnall, general manager of the Partin Manufacturing Company, Chicago, Ill., announces the

appointment of Joseph M. Kraus, formerly of New York City, as a d e r t i s i n g manager. He will take immediate charge of the extensive publicity c a m p a i g n which the company is arranging for Partin-Palmer cars for the 1915 season.



Joseph M. Kraus, Advertising Manager, Partin Manufacturing Company.

P a r t i n - P a l m e r cars were introduced about a year ago, and the success which has attended their initial appearance has been such as to warrant the company in making more extensive plans for the future. Mr. Kraus has had a very broad advertising experience, having sold space, written copy and made a thorough study of the proposition from all aspects.

NET PROFIT OF \$1,115,000.

Balance Sheet of Indiana Refining Company Shows Splendid Year's Business.

The annual report of the Indian Refining Company (of Maine), which concern handles

the sale of Havoline oil, and subsidiary companies, for the year ending Dec. 31, 1913, shows net earnings, after deducting all charges, of \$1,115,601. The company set aside a general reserve of \$610,465, equivalent to the year's first mortgage bonds sinking fund payments, against exhaustion of oil deposits and other contingencies. The balance sheet follows:

Assets.	
Properties, pipe lines, storage tanks, real estate, selling stations, investments, etc..	\$5,812,970
Inventories	830,369
Advances to salesmen and others.....	20,673
Accounts receivable	976,860
Bills receivable	13,943
Foreign accounts	78,660
Cash	675,332
Accounts in process of adjustment.....	450,000
Insurance fund assets.....	19,399
Sinking fund assets.....	62,271
Suspended organization expenses and unamortized flotation expenses.....	684,929
Profit and loss deficit, subject to shrinkage of deferred and suspended assets.....	\$2,714,879
Total.....	\$12,340,286
Liabilities.	
Capital stock outstanding.....	\$6,000,000
Bonds	2,645,000
Second mortgage notes	1,923,600
Car trust obligations.....	395,000
Mortgage on Newark Meadows property.....	15,471
Vouchers and accounts payable.....	362,983
Bills payable	284,006
Interest accrued on funded and current liabilities	74,094
Unpaid and unclaimed dividends.....	10,268
Reserves	629,864
Total.....	\$12,340,286

PAINESVILLE CITIZENS AROUSED.

Offer for Removal of Vulcan Car Plant Results in Holding Mass Meeting.

Citizens of Painesville, O., held a mass meeting April 15, for the purpose of discussing the possibility of securing additional local capital, in order that there shall be no question as to the permanent establishment of the plant of the Vulcan Manufacturing Company, maker of Vulcan passenger cars, in that city. It had previously come to the attention of the people that offers had been made from other cities, looking toward a removal of the factory.

The Vulcan Manufacturing Company entered the automobile field last year, and the presentation of its line has been followed by a large number of orders. The Vulcan cars were first placed in the market in January, since which time there has been an average of 200 employees on the pay roll. As is true of all growing concerns, additional capital is necessary in order that the company may keep abreast of its orders, and this is the point which is interesting Painesville men at present.

TO SELL HERRESHOFF PLANT.**Referee in Bankruptcy Grants Trustee's Petition for Sale on May 1.**

Acting on a petition from the Detroit Trust Company, trustee in bankruptcy, requesting permission to sell all the assets of the Herreshoff Motor Company, Detroit, Lee E. Joslyn, United States referee in bankruptcy, has issued an order making the date of sale 10 in the morning of May 1, confirmation to be made May 5. The trustee states that the Herreshoff company will be sold free of all incumbrances. The following schedule has been filed:

Liabilities.	
Taxes due	\$3,999.88
Wages	337.73
Secured claims	52,862.20
Unsecured claims	85,620.03
Total.....	\$142,819.84
Assets.	
Real estate	\$150,000.00
Cash on hand	959.92
Bills, promissory notes and securities.....	150.00
Stock in trade	81,297.81
Books, prints, pictures.....	39,128.42
Carriages and other vehicles.....	4,000.00
Machine tools, etc.....	16,155.78
Patents, copyrights and trade mark.....	2,500.00
Debts due on open accounts.....	27,611.81
Deposits of money in bank and elsewhere....	23.54
Total.....	\$321,827.28

It is stated that the Peninsular State Bank of Detroit holds a real estate mortgage of \$25,000. It is understood that the referee in bankruptcy is planning to dispose of the land and buildings on easy terms, and that the purchaser can do so on contract.

TO MANUFACTURE BENZOL.**United States Steel Corporation Makes Appropriation for This Purpose.**

The United States Steel Corporation, Pittsburgh, Penn., has made an appropriation of \$400,000 for a large extension to the by-product coking plant at Farrell, Penn., which is to be utilized for the production of benzol. This is believed to be the first attempt made by an American concern for the production of this substitute for gasoline as automobile fuel.

Benzol has been employed with success by a number of foreign automobile users, both as a distinctive fuel and in combination with various proportions of gasoline and kerosene. The Carnegie Steel Company has been experimenting for some time at the Farrell plant, and it is reported that it has been found that about two per cent.

of the coal tar can be converted into benzol. Work will be started on the new buildings in the near future.

FORM \$3,000,000 COMPANY.**New York Men Organize Concern to Exploit Entz Electric Transmission.**

A certificate of incorporation has been filed by the Entz Motor Car Corporation at Albany, N. Y., the capital stock being \$3,000,000. The incorporators named are W. B. Harding, Adolph Widder and A. C. Johnson, but it is understood that among the other men who are identified with the venture are R. M. Owen, R. R. Owen, Roy Rainey and Robert H. Montgomery. It also is stated that Carl H. Page, formerly at the head of the Carl H. Page Company, New York City, also is interested.

The new concern will undertake the active exploitation of the Entz electric transmission, which is said to have been invented by Justus B. Entz some eight years ago, although formal announcement of the production was not made until a few months ago. For some time R. M. Owen and his brother, R. R. Owen, are said to have been engaged in experimentation with the transmission in a laboratory at 136 West 52nd street, New York City.

The transmission was developed by Mr. Entz while employed by the Electric Vehicle Company at Hartford, Conn., later the Columbia Motor Car Company. It is stated that a few cars were equipped with the device at that time, and that, upon the failure of the original company, the patents passed into the hands of R. M. Owen, who was until recently head of R. M. Owen & Co., general distributor for Reo cars.

MAY LOCATE IN LYONS.**Representative of Wahl Automobile Company Confers with Local Business Men.**

A dispatch from Lyons, N. Y., states that a representative of the Wahl Automobile Company, Detroit, who also is interested in the Hazard Motor Company, Rochester, N. Y., recently held a conference with the Lyons Business Men's Association, looking toward the possible location of the Wahl plant in that city. The report also states that the plan involves a consolidation of the Hazard and Wahl companies.

The proposition is understood to depend upon the inclination of Lyons citizens to subscribe for

\$20,000 worth of stock. The high cost of real estate in Rochester is given as the reason for the change on the part of the Hazard company, and the present labor situation in Detroit is held to have influenced the Wahl company in its desire to locate in a smaller city.

HANDLES CANADIAN SALES.

Hoover Holton of Empire Sales Force Receives Well Merited Promotion.

Announcement is made by the Empire Automobile Company, Indianapolis, Ind., that Hoover Holton, for a long time prominent in the sales work of that company, has been appointed Canadian sales manager. He will devote his entire energy to the further development of Empire

sales and distribution in Canada, operating from the offices of the Empire Automobile Sales Company, with headquarters at London, Ont.

Mr. Holton is well known throughout the industry and trade. He joined the Empire company as sales manager when the concern was organized in 1911. Later he



Hoover Holton, Canadian Sales Manager, Empire Automobile Company.

resigned to become connected with another Indiana company, but shortly thereafter returned to the Empire, engaging in sales development work in the South and East. In this field he was particularly successful in opening new territory, and his most recent appointment comes in the nature of a well earned promotion.

TO OPEN BOTH PLANTS.

Nyberg and DeTamble Factories in Anderson, Ind., Soon to Resume Production.

According to information from Anderson, Ind., it is expected that both the Nyberg and

DeTamble plants in that city, which have been inactive for some time, will be reopened for the production of motor vehicles in the near future. It is understood that the manufacture of trucks will be undertaken at the Nyberg plant and passenger cars in the DeTamble factory.

A short time ago it was announced that a Chicago man had purchased the assets of the Nyberg Automobile Works and that this factory would be operated in conjunction with the plant of the old Streator Motor Car Company in Streator, Ill. It is not stated, in the information from Anderson, whether or not the latest developments are in connection with that plan.

WILL PRODUCE TRUCKS.

James J. Dauch Organizes Company to Take Over Assets of Sandusky Concern.

With an authorized capital of \$1,000,000, the Dauch Manufacturing Company has been incorporated in Sandusky, O., by James J. Dauch and his associates. It is stated that this company will take over the assets of the Sandusky Auto Parts & Motor Truck Company, which were purchased recently by Mr. Dauch.

It is understood that the plans of the new concern include the production of motor trucks, but whether these will follow the details of designs and construction of the Sandusky product is not stated. The factory will be placed under the management of George A. Schwerer, formerly connected with the Ohio Motor Company.

WOULD FORM NEW COMPANY.

Charles I. Kirkham Says Demand for Small Motors Is Growing Very Rapidly.

Charles I. Kirkham, who founded the Kirkham Motor Works at Bath, N. Y., has placed a proposition before the Business Men's Association in Corning, N. Y., looking toward the organization of a new company for the manufacture of small four-cylinder motors. He declares the demand for this type of engine has increased very materially of late, and he expects it will grow very rapidly because of the popular interest in the light automobile.

Mr. Kirkham's plan calls for a capital of \$100,000, \$40,000 preferred and \$60,000 common. He desires, as his share, \$35,000 of the common stock, and states that he has a tentative contract for 3000 four-cylinder motors for one concern. The Corning business men will give the matter further consideration.

DE PALMA TO DRIVE ABROAD.**Vanderbilt Cup Winner Will Pilot Vauxhall in French Grand Prix.**

Ralph De Palma, the well known racing driver, who won the Vanderbilt Cup race at Santa Monica, Cal., Feb. 21, announces that he will drive a Vauxhall car in the French Grand Prix, which will be run July 4. He is to participate in other important road races on the Continent this year, and previous to the Grand Prix, will take part in a meet at the Brooklands track, Weybridge, England.

MILLER TIRE RECORD.**Maker Calls Attention to the Fact That These Still Hold World's Road Mark.**

In view of the near approach of the 1914 international sweepstake race for 500 miles on the Indianapolis speedway, it is of interest to learn that no less than eight drivers in that event are now negotiating for the use of Miller tires, made by the Miller Rubber Company, Akron, O. And at the same time the maker calls attention to the fact that these tires still hold the world's road racing record at a speed of 78.5 miles an hour, a mark set by Teddy Tetzlaff in a Fiat car at Santa Monica, Cal., two years ago, in May, 1912.

Because of the important part played by tires in the recent Vanderbilt Cup and Grand Prize races over the Santa Monica course, it is anticipated that there will be lively competition among the various tire makers for representation in the forthcoming event on the Indianapolis speedway.

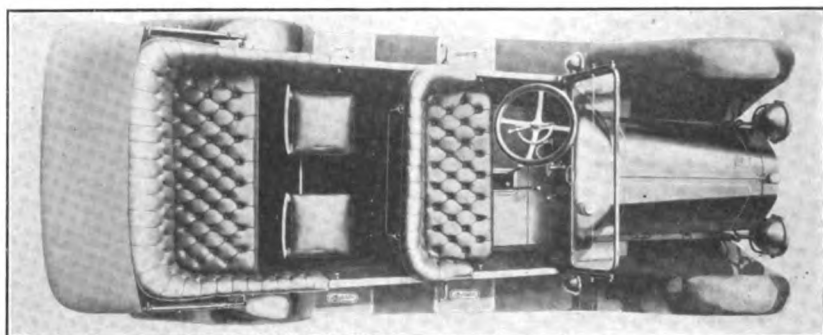
SAFETY FIRST SOCIETY.**New Organization in the Metropolis Seeks to Protect from Danger.**

The Safety First Society of Greater New York is a new organization which has for its object the lessening of the number of accidents on the streets and railways of that city. The secretary is Frederick H. Elliott, well known throughout the industry through his connection with motoring bodies of both local and national importance.

Committees have been appointed to take charge of various phases of the work, which include the interesting of school children in the movement of "Safety First". Cards will be distributed in the schools, each of which will be organized into districts, and children will be taught carefulness in crossing the streets. Older boys will guide younger children at crossings, etc. Illuminated globes at subway entrances will serve to call attention to the movement at night.

TO A MIRROR FINISH.**Studebaker Fenders Must Reflect Face of Workman in Order to Pass Test.**

Without being in the least vain over his personal appearance, there is a veteran foreman in the works of the Studebaker Corporation, Detroit, who admits to looking at the reflection of his own face several hundred times a day. His name is Thomas Humphreys, and he is the man



Plan View of Seven-Passenger Studebaker Six-Cylinder Chassis.

who is held responsible for the mirror finish of the black enamel on the fenders, hoods and other pressed steel parts of Studebaker cars.

The parts come completed and polished from another section of the plant, where they have been pressed to shape from the cold sheet steel. Humphreys and his men give them the luster. The enamelling is accomplished by three baths, each of which is followed by a baking process, so that the enamel virtually becomes a part of the surface. The work is held to have been completed, only when Humphreys can tell, by looking at the surface of a fender, whether or not he needs a shave.

An accompanying illustration shows a plan view of a seven-passenger Studebaker six-cylinder machine, and, aside from the mirror finish, it presents the seating arrangement. The two auxiliary seats, when not in use, fold out of the way against the back of the front seat.

DETAILS OF THE LEXINGTON MODEL H.

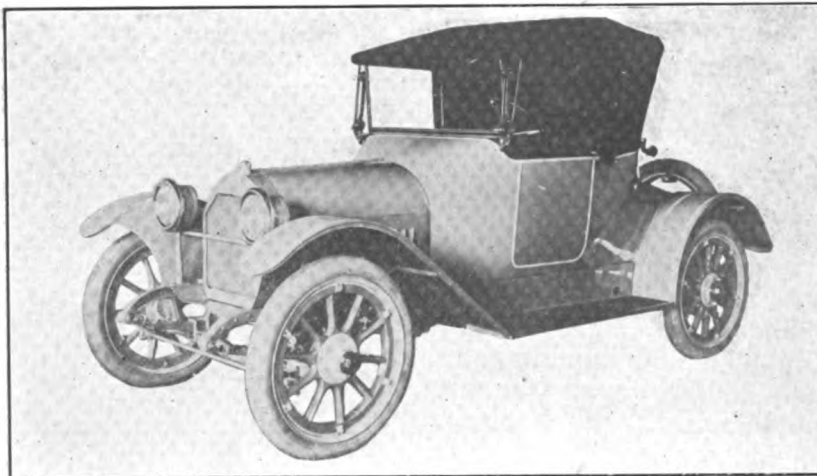
THE Lexington-Howard Company, Connersville, Ind., is producing two chassis, a four and a six, these being designated as the Lexington H and series D Howard. The Lexington four, the mechanical details of which are presented herein, is fitted with a two-passenger roadster and a five-passenger touring body. There are many refinements as well as conveniences noticeable in the new design and the equipment leaves nothing to be desired.

The cylinders, which are cast en bloc, with cored inlet passages, have a bore of four inches and stroke of five, and the S. A. E. rating of 25.6 horsepower is stated to be very conservative. The valves are interchangeable, located on the right, of ample diameter, and all operating

One of the features of the motor is the use of the Moore multiple exhaust system, which provides practically a separate passage for the first and second cylinders, also the last two. The Atwater Kent ignition system with automatic advance is utilized and in addition a limited amount of advance and retard, controlled by a small lever situated on the top of the steering wheel, is provided. This feature is designed to supplement the automatic, but not to interfere with its action, as it permits the driver to throttle the motor down to very low speeds when idling. The control lever also makes possible starting the automatic advance from any position selected on the wheel.

The clutch is a multiple disc of the dry plate type and is held to have easy engaging qualities. The gear-set is of the selective design, providing three forward speeds and a reverse. The gears are of nickel steel, carried on ample sized shafts mounted on large annular ball bearings. The gear case is flanged and bolted direct to the flywheel housing. The gear shifting lever is mounted on the top of the gearset case and the cover is not only large, but is easily removed.

Shaft drive is employed, two universal joints being utilized, and these are thoroughly enclosed and packed in grease. Each joint is fitted with a companion flange, allowing easy re-



Lexington Model H Roadster, an Attractive Design with a Complete Equipment, Including Electric Lighting and Motor Starting.

mechanism is enclosed. The crankshaft is of the three-bearing type, of 40-point carbon steel. The connecting rods are of the I beam section type with die cast bearings at the large end, and are clamped to the wristpin. The pistons are of close grain gray iron, accurately machined and ground to size, and the four eccentric rings are ground on three sides.

Lubrication is by the constant level splash system, a plunger pump operated by an eccentric on the camshaft maintaining the proper level, and a conveniently located gauge indicates the supply at all times. The camshaft and pump shaft are actuated by helical gears operating in a bath of lubricant. Cooling is by a large centrifugal pump, assisted by an adjustable fan, and the radiator is a large honeycomb design. Carburetion is by a late model Schebler.

removal of the shaft without disturbing other parts. The shaft material is nickel steel.

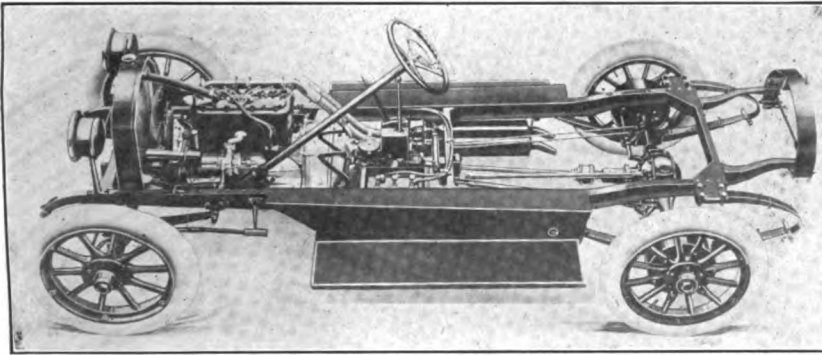
The rear axle is of the full floating type with drive shafts of 3.5 per cent. nickel steel with flanges bolted to the wheel hubs. Annular ball bearings are employed. Two sets of internal enclosed brakes are provided, the service being actuated by pedal and the emergency by the conventional lever. Both are ample in width and diameter. The torque rod is triangular in shape, constructed of seamless steel tubing electrically welded to drop forgings at either end. It is swivelled to the rear axle and carried in heavy cushion springs, these being mounted in a carrier swivelled to a bracket on a cross member of the frame.

Semi-elliptic springs are employed in front and three-quarter elliptic at the rear. Both sets

are long and very flexible and the rear members are underslung, providing a low centre of gravity. All spring eyes are bushed with bronze, fit-

is suspended on the main frame under the front toeboard, an accessible position.

Both the five-passenger touring and two-passenger roadster bodies are attractive designs. The lines are graceful, and among the features is the use of large doors, permitting easy entrance and exit. All hinges are concealed and the cap moldings match the highly finished dash and instrument board. Nothing but the very best curled hair and genuine hand buffed long grain leather are used in the upholstery, which is very deep. The finish is in keeping with the design. The equipment is most complete and includes a mo-



Chassis of Lexington Model H, a Well Designed Construction Having Unit Power Plant, Underslung Rear Springs and to Which Are Fitted Two Types of Bodies.

ted with hardened and ground bolts, and have integral grease cups.

The front axle is a solid drop forging of the I beam section type, has large spindles fitted with large annular ball bearings, and the tierod is placed in front of the axle. The frame is of pressed steel, very deep, and has extra wide flanges. It is narrowed at the front to provide a short turning radius and has the usual pickup at the rear. The wheelbase is 114 inches. The driver is placed at the left.

The tire holders are attached to arms constructed of a part of the frame. Provision is made for carrying one or two shoes without the use of straps, the casings being clamped into position much in the same manner as the rim is supported on the wheel, the tire tool being employed for this work. This method not only makes for a rigid mounting, but eliminates possibility of chafing. Demountable rims are standard equipment.

The electric lighting and motor starting system is a unit, a motor-generator which is driven by means of an enclosed silent chain. The energy of the motor starter is applied to the crankshaft of the engine by pressing a button conveniently located and, upon the engine starting, releasing the button automatically opens the circuit, causing the unit to operate as a generator charging the battery. The output of the dynamo is automatically regulated and is held to be ample for all requirements. The battery

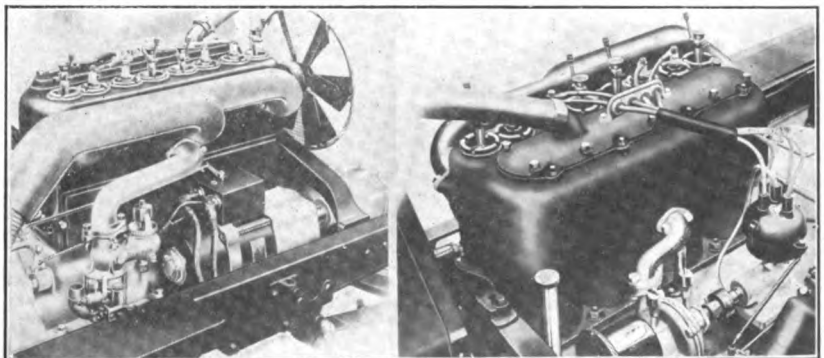
hair top, ventilating type of windshield, tools, etc.

TAKES OVER STEARNS BRANCH.

Ruess and Dingley Will Handle This Line in Los Angeles District.

Another well known motor car manufacturer that has followed the example set by the makers of the Peerless and KisselKar in abandoning factory branches, is the F. B. Stearns Company, Cleveland, O. A deal has been consummated by William P. Ruess, who takes over the branch at Los Angeles, Cal. He assumes complete control of Stearns sales in Los Angeles and surrounding territory.

Bert Dingley, a well known racing driver, who has driven Pope-Hartford cars in many important road races and long distance events, is associated with Mr. Ruess, who also has competed in motoring contests on the Pacific Coast.



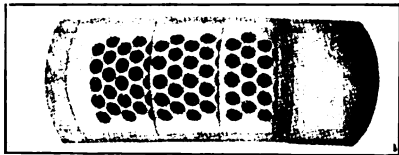
Showing Right and Left Sides of Lexington Four-Cylinder Motor, a Compact Design.

NEW ACCESSORIES FOR THE MOTORIST.

LEE PUNCTURE PROOF TIRE.

Construction Includes Hardened Steel Discs Which Overlap.

The Lee Tire & Rubber Company, Conshohocken, Penn., is manufacturing the Lee puncture proof tire, so



called because it is stated to be impervious to nails, etc., which ordinarily penetrate the tread and fabric of conventional types of shoes. An accompanying illustration shows the construction of the Lee puncture proof tire and it will be noted that a large number of metal discs are imbedded under the tread within the tire.

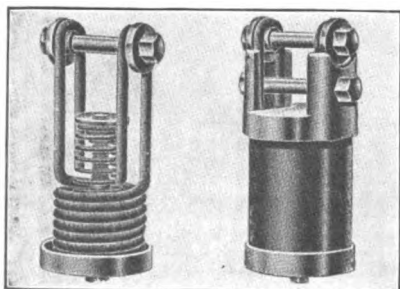
The discs are of hardened laminated steel, and while they overlap, they do not touch. It is stated that they reinforce the tire body, and at the same time protect it and the inner tube from articles that would puncture, also from the effects of water or moisture. It is added that the resiliency of the shoe is not affected and that it will not heat. A cash refund is included in the selling agreement. The Goodby-Rankin Company, Providence, R. I., is Rhode Island distributor.

JOHNSON SHOCK ABSORBER.

Principle Involves Use of Two Concentric Coiled Springs.

The Johnson shock absorber is manufactured by the Triple Action Spring Company, 55 East 28th street, Chicago, and is made in four different sizes, the smallest being suitable for Ford machines and the largest for five-ton commercial vehicles.

The principle involves the use of two concentric coiled springs, one being utilized to compensate for the lighter shocks and the other to care for the heavier ones. The main spring is ample in diameter, and being of heavy stock has ample capacity for absorbing considerable shocks. The maker calls attention to his design, stating that it has an advantage over other types in this respect.



The main spring is a double coil, with the upper ends bent into the form of loops, providing a simple construction and one making for easy attachment of the shock absorber to the upper spring shackle bolt of the machine. A central adjusting bolt provides for an adjustment of 1000 pounds.

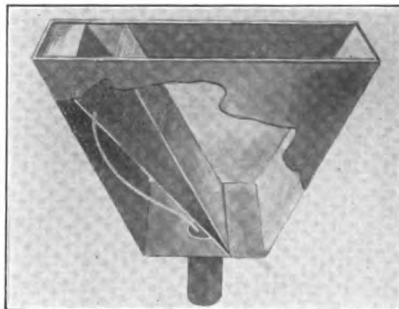
A weather proof casing is fitted over the springs and it serves as a spacer, as well as contributes to the neatness of the design.

NO-SHAMMY FUNNEL.

Permits Fuel to Flow as Freely as with an Ordinary Funnel.

The No-Shammy funnel is manufactured by the No-Shammy Products Company, Cleveland, O., and is marketed by Chas. E. Miller, 97-103 Reade street, New York City. One of the qualities of the design is that the gasoline will flow as readily as through an ordinary funnel not equipped with a screen or filtering means. With the No-Shammy the fuel passes through quickly, while all water and foreign elements are trapped.

The principle of operation is the



difference between the specific gravity of gasoline and water. When the fuel is poured into the funnel, any water and heavy sediment in it immediately settles to the bottom of the funnel, while the gasoline floats off through a gauze member. The particles of dirt held in suspension are prevented by the gauze from passing over.

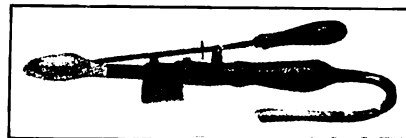
It is pointed out that water can rise to the top of the funnel, as the film of gasoline over the gauze prevents it passing through. This is secured by scientific determination of the angles of the walls, position and mesh of the gauze, etc. The No-Shammy funnel is not only inexpensive, but is sturdily constructed and guaranteed. It is made in three sizes, for garage, owner and for motorcycle.

Particular attention is called to the Classified Buyers' Guide, found elsewhere in this issue. Listed therein will be noted names and addresses of concerns manufacturing tools, supplies and material useful in the overhaul of the motor car, as well as its equipment. In writing always mention The Automobile Journal.

READYHOT TORCH.

Utilizes Gas or Acetylene and Is Adapted for Brazing.

The Nemo Chemical & Specialty Manufacturing Company, 510 Rector building, Chicago, is marketing a



very practical and useful article both for the public and private garage. It is termed the Readyhot brazing and soldering torch, and one of the qualities of the design is that it can be employed for brazing and soldering.

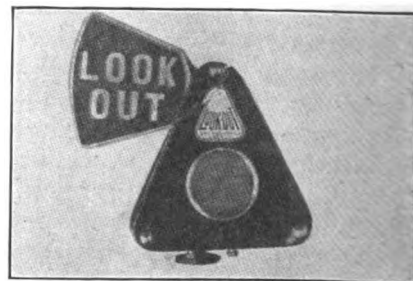
The supply of fuel for obtaining the desired temperature may be secured from the regular gas supply or from a Prest-O-Lite tank, suitable connections being provided. The Readyhot torch is always ready for service, and it is stated that there is no delay in obtaining the necessary heat, and that a steady temperature is maintained. It can, however, be adjusted for any desired heat. The alternating inspirator is so graduated that practically any metal can be heated to a melting point in a short time. Owing to the unique construction the torch can be utilized in places not accessible with ordinary soldering equipments.

BAER ALARM SIGNAL.

Shows Plate Bearing Words "Look Out" and Is Operated by Button.

The Baer alarm signal is marketed by the Baer Manufacturing Company, Philadelphia, and is an ingenious warning device which differs from those of conventional design. It is operated by the current of a storage battery or similar source of supply, and when the circuit is closed a plate bearing the words "Look Out", rises from its normal position in a case. The movement of the signal is accompanied by a loud "click".

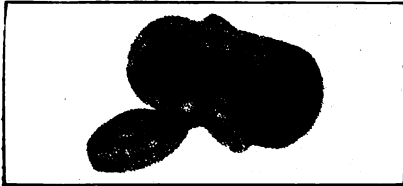
With the Baer design provision is made to indicate the proper working of the signal, a miniature tell-tale located next to the press button showing when the device operates properly. The button fitting is constructed for convenient attachment on the steering wheel.



FARNSWORTH GENERATOR.

Makes Possible Use of Heavy Fuels and Distillates.

The Farnsworth gas generator, marketed by the Distillate Motor Equipment Company, San Francisco,



Cal., makes possible, it is claimed, the operation of a motor car with kerosene, distillate and other low grade fuels. The exhaust gas is utilized for raising the temperature of the fuel, and the generator shown in the accompanying illustration is attached to the carburetor in such manner that the exhaust taken from the exhaust manifold is passed around the chamber of the device. The generator itself is cylindrical in form.

It is stated that tests made with the device resulted in a great saving of gasoline, and that considerably more energy was developed by the motor. Similarly, it is claimed that the mileage a gallon was increased, it being 12.6 miles without the generator and 15.3 with the apparatus installed on a standard make of pleasure car.

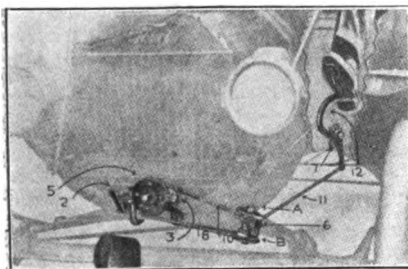
PERFECTION STARTER.

Mechanical Design for Model T Ford Cars Operated by Pedal.

The Perfection Auto Starter Company, 1561 Broadway, Denver, Col., is marketing a mechanical starter for the model T Ford car termed the Perfection. The maker states that any mechanic can attach it to the machine in one hour or less and that complete instructions are given if owners desire to install the device.

The starter is actuated by the pressure of the foot, much in the same manner as depressing the conventional clutch pedal. This lever or pedal member is located at the left of the regular clutch member and is connected by suitable linkage to a pulley member located just below the left hand lower corner of the radiator.

From the pulley leads a chain which actuates the starter ratchet. The last named member is fitted to the extension of the crankshaft and it does not interfere with cranking



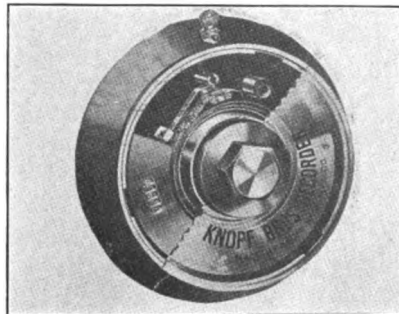
of the motor in the usual manner, as provision is made for an emergency brake handle which is included in the equipment. In the illustration the casing protecting the mechanism from foreign elements is shown displaced. Included with each Perfection starter is a device for making possible priming the carburetor from the seat. One of the qualities of the starter emphasized is that it may be fitted without displacing the radiator.

KNOFF RECORDER.

Registers Mileage Distance, Stops, Etc., on Removable Tape.

The Knopf Bros. Manufacturing Company, Inc., 2071 Seventh avenue, New York City, has brought out a new type of mileage recording instrument, the operating mechanism of which is contained within a case which is attached to the wheel by several screws entering the spokes or hub flanges. The screw heads, however, are inside the case, which is provided with a lock.

The mechanism is suspended inside by ball bearings with a weight to maintain it in its proper position.



The odometer is operated by a cam located inside the case, which strikes a roller once during each revolution of the road wheel, actuating an arm which moves a ratchet wheel one notch. The odometer registers to 10,000 miles and repeats, but it cannot be set back without completely disassembling.

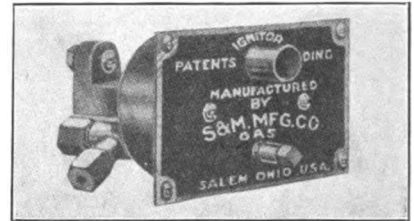
A cylinder in the upper end of the odometer rotates once for each mile travelled by the car, causing an arm to oscillate with a slow, continuous motion, once for each mile. The arm carries at its upper end a stylus, which produces a record on a tape as it is drawn out from a little round box at the top of the instrument.

At the right of the weight is a clock which will run for 36 hours on one winding. It is geared to a large drum surrounding the central wall of the instrument, upon which the tape is wound at such speed that the stylus comes opposite the hour marks at the proper time. The tape is sensitized so that the pressure of the metallic stylus traces a line upon it, and it is graduated into three-minute periods, two inches being allowed for each hour. The recorder registers starting, stopping and operation of the vehicle, as well as the rate of speed, and they are outlined on tape.

S. & M. GAS LIGHTER.

Controls and Lights Acetylene Headlights from the Seat.

The S. & M. gas lighter appliance is marketed by the S. & M. Manufacturing Company, Salem, O., and is an



electrical device which enables the operator of a car to control his gas lights from the seat. The gas is turned on at the dash, a diaphragm regulator preventing it from being turned on too high by controlling the pressure from the tank. This insures the proper sized flame at all times.

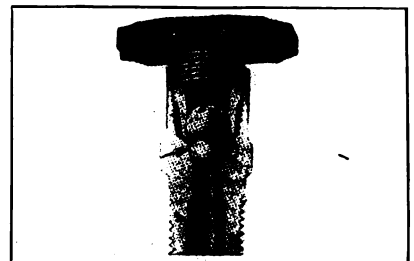
Ignition of the gas is effected by an electrical circuit which starts at the rear spark plug and runs to one terminal of the controlling valve switch. From the other terminal a wire is led to the right hand burner, which is wired across to the other headlight and grounded. Special burners are necessary with the system and are included with each equipment. The outfit is moderately priced.

MORGAN PRIMING CUP.

May Be Utilized When Motor Is Hot and Has Novel Valve.

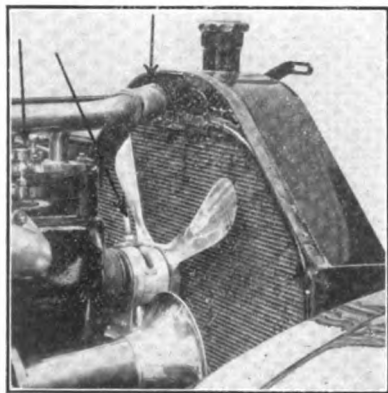
The Morgan Manufacturing Company, Newport, R. I., is marketing a practical form of priming cup which presents several interesting features, among which is that it may be operated when the motor is hot without burning the hands. As will be noted by the accompanying illustration, the head or operating member is composed of a non-conducting heat material.

The base is made of steel, threaded at its lower end as usual to fit the cylinder, while the upper is tapped out to receive the cup portion. The base is provided with a bevel shaped seat into which fits a ball shaped valve which is free to revolve. By inserting the cup portion into the base the ball shaped gas tight valve finds its own centre. The ball valve is fitted with a slot so that it can be ground with a screw driver when necessary. Priming opening is large.



CLEANING AND REPAIRING RADIATORS.

THE cooling system of a car, especially that of a machine that has seen considerable service, will require attention, and this applies particularly to radiators in which an anti-freezing solution has been employed.



Inspect Tubing for Loose Fabric.

Continued use of these solutions during the cold weather to prevent freezing of the cooling fluid, leaves deposits in the radiator, water jackets and piping which are likely to impair the efficiency of the system in mild or warm weather.

Some motorists content themselves with running off the solution, refilling with clean water and running the motor for a few minutes, then draining off the fluid and again filling the radiator. If an alcohol solution has been utilized during the cold weather, and the motor operated long enough with the mixture replaced by water, it may be possible to displace all deposits by this method, but the water should be changed until it is free from discolorations.

The better method, and an inexpensive one, is to prepare a solution of common washing soda and water, dissolving as much of the soda as possible. It is better to employ fairly hot water and before pouring the mixture into the radiator, run the motor until the anti-freezing mixture is warm, then open all petcocks. The motor should be operated with the soda solution, the period of running depending upon the age of the car. If it be an old model it is advisable to drive the car for some distance with the soda solution before removing it.

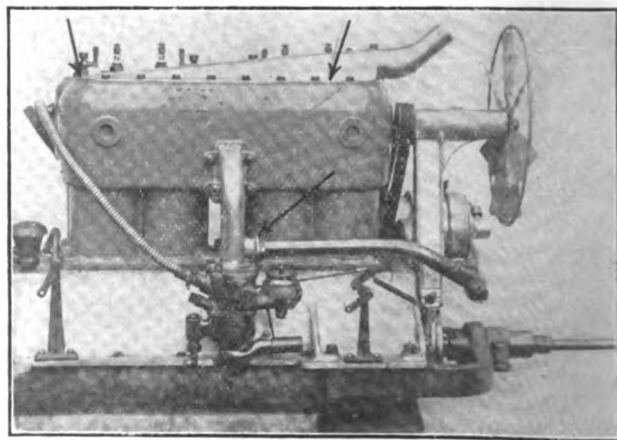
After draining off the mixture, refill with warm water if possible, as using cold water in an old radiator when hot causes a sudden contraction of the metal and may result in injury. The water should be changed until it shows no discoloration. The radiator makers advise using rain or distilled water, as the average water is too hard, containing elements that manifest themselves by a brick like deposit. If rain water cannot be obtained it is a good practise to

change the water in the cooling system at least once a week. This is particularly applicable to cars which have a tendency to overheat on warm days.

If the machine is to be overhauled and the work includes the power plant, it is best to clean out the circulating system before removing the radiator. It will also afford an opportunity to note if any leaks exist in the cooler. If any be discovered it should be sent to an expert on radiators for repairs. The writer is of the opinion that the ordinary tinsmith is not capable of repairing certain types of radiators, and that one cannot be too careful in selecting the person making the repair. It is not advisable for the owner to undertake the work, as soldering radiators is an entirely different proposition from ordinary work.

There are several radiator cements marketed which are not only inexpensive and easily used, but efficient. The writer can vouch for these, having used them on several different makes of radiators with success. Among these is *Se-ment-ol*, manufactured by the Northwestern Chemical Company, Marietta, O., and it can be found at any supply house.

While directions accompany each can of *Se-ment-ol*, a description of its use will be of value to those who contemplate using it for the first time. If an anti-freezing solution has been used, it should be removed, and the radiator flushed out with water. Refill with clean water, start and operate the engine until the water is warm. With the motor running, pour *Se-ment-ol*, a little at a time, into the radiator until entirely dissolved. Ordinarily, operating the motor about

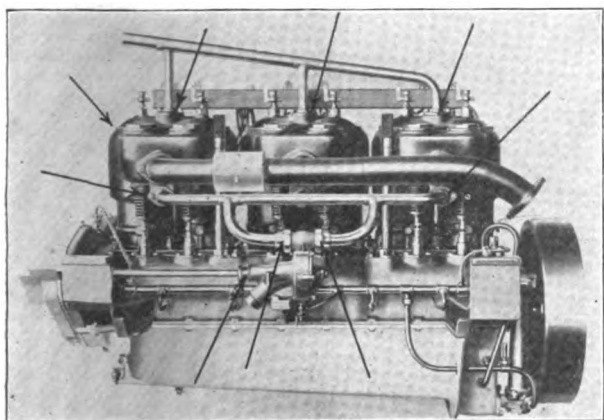


Outlet and Inlet Water Manifolds and Connections May Need New Gaskets.

15 minutes will suffice, but if the cooler leaks badly it may require a longer period.

It will be noted that the fluid emerging from the openings is red and that at first it will run freely, but in a short time it will gradually lessen, finally ceasing. This is due to the chemical action taking place when exposed to the air, layers of cement hardening around the leak until it finally closes. One of the qualities of Se-ment-ol is that it is a cleansing compound, and the company states that it will displace corrosions, deposits, etc. It should not be left in the radiator, but removed after the leaks are cemented, and the cooler should be refilled with clean water.

Another radiator cement is Rad-Fix, manufactured by the Radiator Fix Company, 121 Massachusetts avenue, Boston. This is a filtered solution which is stated will pass through the screen of the filler cap and, mingling with the water, form a preparation that cements any



Indicating Components of the Cooling System That Should Be Inspected.

leaks. It is held to be very efficient in cleansing the cooling system, in that it will cut rust, etc. The repair made by Rad-Fix is stated to be permanent and the preparation is guaranteed to be harmless.

The International Metal Polish Company, Indianapolis, Ind., markets a radiator compound known as the Blue Ribbon radiator cement, which is guaranteed to repair an ordinary leak in a few minutes. It is placed in the water and circulated throughout the system, stopping leaks through the composition hardening when exposed to the air.

All rubber piping employed in the cooling system will require careful inspection, especially if glycerine was used in the anti-freezing mixture. Glycerine attacks rubber and it may be found necessary to replace the connections between the radiator and intake and outlet mani-

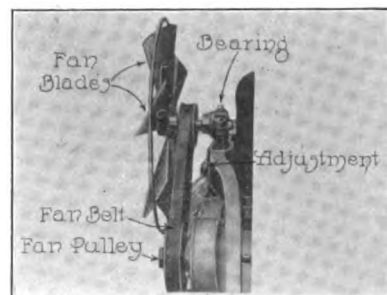
folds. These pipes should be inspected on old machines, for after considerable service the plies of fabric and rubber separate, restricting the passage of water. Frequently overheating is due to this cause.

In replacing faulty connections with new it is better to use a clamp than wire, and there are several practical types marketed.

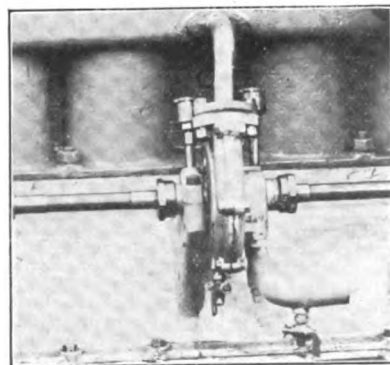
If the motor is dismantled, new water gaskets will be necessary, unless one is very careful in displacing the old members. The latter should be put to one side, as they will be useful as patterns for the new gaskets. The thickness of the old members will serve as a sample and if it is factory material it is best to employ the same grade. Accompanying illustrations show the various components of the motor with which gaskets are necessary to prevent leakage of the cooling fluid, the parts being indicated by arrows. In replacing bolts and nuts retaining these components they should be first cleaned and the threads coated with a mixture of graphite and oil. This will prevent rust and sticking of the parts.

The stuffing boxes of the water pump may require attention and these should be packed according to the directions of the maker. Some recommend the use of candle wicking saturated with grease in which is mixed powdered graphite, and in packing the box do not set up the adjusting nut too tightly, else wear of the pump shaft will result. It is best to make a second adjustment than to cut the shaft.

Before replacing the fan belt it is a good plan to test the bearings of the fan and of the pulleys. The majority of the fans are provided with ball bearings, the adjustment of which is an easy matter. All grease cups or lubrication members ought to be cleaned, after which new lubricant should be used.



Adjust Fan Belt and Examine the Pulleys.

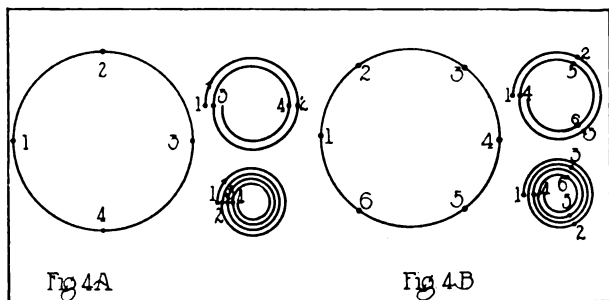


The Water Pump Stuffing Boxes May Require Packing.

BALANCING INTERNAL COMBUSTION ENGINES.

Second Installment of F. W. Lanchester's Paper Deals with Elimination of Torque Reaction and with the Balancing of Four-Cylinder Motors.

IN THE first installment of F. W. Lanchester's paper on Engine Balancing, read before the Institution of Mechanical Engineers, London,



England, the defects of balance to which a single-cylinder engine may be subjected, and torque vibrations, were discussed. The second installment presented herein deals with the elimination of torque reaction and with the balancing of four-cylinder engines.

Balancing Illustrated by Model.

It has already been pointed out that one of the advantages of the multi-cylinder engine is the reduction of the irregularity of the recoil torque; the greater the number of cylinders, the more nearly the driving effort is constant, and counterpart to that, the more nearly the recoil torque is constant, but in order to obtain the best results from the multiplicity of cylinders, it is self-evident that the distribution of the impulses should be made as nearly uniform as possible. This point has been touched on in considering the two-cylinder engine.

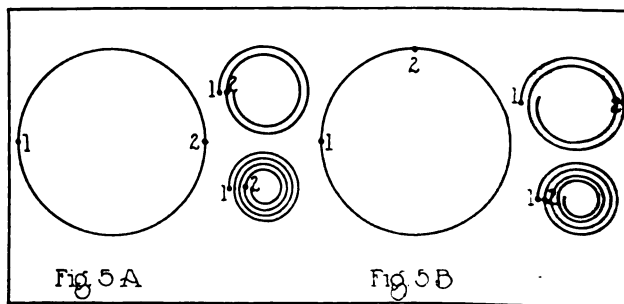
The author some 10 or 12 years ago devised a simple means of illustrating in four-stroke cycle engines the relations between impulse frequency, the fundamental piston frequency, and the octave piston frequency, in order to illustrate in a diagrammatic manner the virtues and failings, from the point of view of vibration, of engines of different cylinder number and type. This device is represented in Figs. 4 to 6. Three drums are provided, of which the diameters are in the relation of the respective frequencies in question, namely, in the ratio of 1 to 2 and 4, and strings threaded with a number of beads to correspond with the number of cylinders are provided. The drums will be referred to as the cycle drum, the main drum and the octave drum. Taking, firstly, as an illustration, Fig. 4 A, a string threaded with four beads representing a four-cylinder engine, in order that the impulses should be equally spaced, the beads are arranged at equal distances, that is to say, quadrants on the periphery of the cycle drum. If, now, the string is passed round the main drum, it will take two turns and the beads will be found two on one side and two on the other, diametrically opposite; this demonstrates that the main vibration is balanced by two cylinders being always opposed to the other two. Now let the string be passed round the octave drum; it will be found that in the four turns the beads all come on one side of the drum, thus denoting what we already know quite well, that in the four-cylinder engine the secondary or octave vibration is totally unbalanced, the four cylinders acting synchronously. Let us now take the case of the six-cylinder engine. On spacing this equally on the cycle drum at the corners of an imaginary hexagon, we find that on the main drum the beads take their place in pairs on the corners of an imaginary

equilateral triangle, and on the octave drum the beads are again found to be in pairs at the corners of an equilateral triangle, showing that the six-cylinder engine is balanced for both fundamental and octave vibration. Let us now try a smaller number of cylinders. We will take the two-cylinder engine in which the impulses are equally divided, and we now find that when the string is placed on the main drum two beads come together, and similarly on the octave drum, showing that both fundamental and octave piston vibrations are unbalanced. If we now so distribute the beads that the fundamental vibration is balanced, by arranging these opposite on the main drum, on passing the string round the cycle drum we see that the two beads are 90° apart, and that the impulses are not properly spaced; on testing the string on the octave drum we find again that want of balance exists. If we take the special two-cylinder engine with opposed cylinders, we require to remember that as the cylinders are opposite the reciprocation balance will be in order when the beads come together, and not when they are on opposite sides; to remind us of this the author has arranged a black and white bead on the string representing this type of engine. Here, arranging the impulses as equally spaced, that is, separated at equal distances on the cycle drum, we find, on placing these on the main drum, the black and white beads come together, and similarly on the octave drum the black and white beads come together, showing the engine to be balanced in both cases.

It is quite true that the present method does not tell us anything we did not previously know, or at least that we could not ascertain in other ways, but it appears to the author none the worse on that account. It is, in effect, a pictorial analogue, and as such is of service.

Recall Balancing—Reverse Rotation.

The fundamental character of rotational recoil has already been demonstrated, and also the fact that no combination of pistons and connecting rods, however elaborate, can affect the recoil kick of a given engine. In the ordinary multi-cylinder engine it has been shown that the trouble is mitigated by substituting a number of distributed torque applications of small magnitude for the intermittent and heavier torque of the equivalent single-cylinder engine. There is a method, however, by which the torque recoil may be eliminated. The author believes the method in question to have been first described in his patent application in 1895; it consists in the employment of two flywheels having opposite rotation. Where two flywheels of equal moment of inertia are arranged or geared together to rotate in opposite directions, the storage of energy does not involve a change of angular momentum of the system; thus if, for example, starting from rest, two equal flywheels be given equal velocities of rotation, the one clockwise and the other counter-clockwise, as in Fig. 7,



a storage of energy has taken place just as effectively as if the two flywheels had been running in the same direction, but the angular momentum of the one is positive and that of the other negative, and the total angular momentum is zero, just as it stood when the fly-

wheels were at rest; hence no torque has been applied to the system from without, and the engine possessing two such flywheels can function without any rotational recoil kick being transmitted by its holding-down bolts. The same result can be demonstrated by a careful analysis and resolution of the connecting rod, piston and crankshaft forces, but the author considers the fundamental method of dealing with the problem here adopted to be preferable. It is easy to make a slip in resolving forces and moments in a complicated mass of link work, and it is an altogether wrong way of tackling the problem.

The method of reverse rotation also provides the solution to another problem connected with balancing; thus, an unbalanced reciprocation can be, in effect, balanced by two rotating weights. Referring to Fig. 8, if two spindles, 1 and 1', be arranged to rotate in opposite directions and carry respectively balance weights 2 and 2', whose centres of gravity in rotation take up the positions respectively a, a', b, b', c, c', d, d', e, e', f, f', it will be seen that the combined centre of gravity of the balance weights follows a straight line path with strictly harmonic motion, the combined centres of gravity being represented by the letters A, B, C, D, E, F, as the spindles revolve.

The principles discussed in the two preceding paragraphs are conveniently illustrated by the old Lanchester type of engine, which may be said to date from patents Nos. 15,045 of 1895 and 13,960 of 1896, and which were manufactured over a period of years extending from 1896 to 1903. Referring to Fig. 11, two parallel single-throw crankshafts were provided and fitted with flywheels of equal moments of inertia, geared together by helical gearing. Two opposed cylinders were arranged symmetrically on opposite sides of the plane con-

drive a car. At each impulse there will be a variation in the flywheel velocity; this, in an ordinary engine, would produce a recoil on the frame, but in the present engine, owing to the reverse rotation, this does not take place. It produces, however, an increased acceleration on the vehicle, that is to say, every time the flywheels are accelerated by the expansion of the gases, the vehicle has to follow suit, and so, owing to the inertia of the vehicle, the transmitted torque, that is to say, the torque between the engine flywheel and transmission mechanism, is a variable torque, and this in turn reacts on the engine and its mounting.

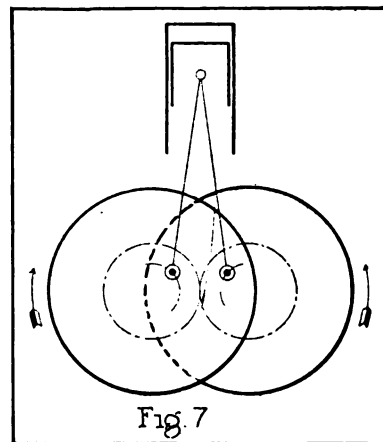


Fig. 7

We have here an extremely interesting property of the engine with reverse rotation, the torque carried by its mounting is precisely the torque impressed by the driven mechanism; in other words, if the work done is intermittent, the torque on the engine mounting is intermittent to a like degree, whereas if the driven torque is constant, the engine mounting is not subject to fluctuation.

It is an interesting point in connection with the motor with reverse rotation that the same means taken to eliminate rotational recoil or kick also eliminate the torque variations and torque vibrations which have been shown to be due to piston inertia.

It is, in the author's opinion, very important to be clear on the distinction between the transmission of vibration to the engine mounting as due to variations in the work done and the transmission of vibration as due to the working cycle of the engine itself. Thus, it may be laid down that in cases where the work done is of an intermittent and vibratory nature, the employment of a motor with reverse rotation may result in transmitting vibrations to the engine mounting to a detrimental degree, and such an engine is therefore bad, whereas in an ordinarily constructed engine with a single flywheel all such vibrations and torque variations are intercepted by the flywheel and are not felt by the engine mounting; it will, therefore, be seen that, broadly speaking, where questions of vibration have to be dealt with, the conditions have to be studied individually, and what may be right in one case may be equally wrong in another.

The manufacture of the Lanchester engine, made in accordance with the patents aforesaid, and described in the foregoing sections, has been discontinued for many years; in spite of this there are, however, several hundreds still on the road. More recently an engine having the same main feature, that is to say, the two crankshafts with oppositely rotating flywheels, has been put on the market under the name of the "Valveless". Fig. 10; this engine, made under patents of Mr. R. Lucas, works on the two-stroke cycle. This a matter quite apart from its balancing devices, which are in their essence identical with those described above. In the Lucas

engine, the crankshafts are acted on by two cylinders side by side with axes parallel; the design is inferior to the Lanchester type in so far that the secondary or octave vibration is not balanced; it is superior from the point of view of simplicity and ease of manufacture, two of the factors which eventually led to the abandonment of the author's earlier type.

The four-cylinder engine, which may be taken broad-

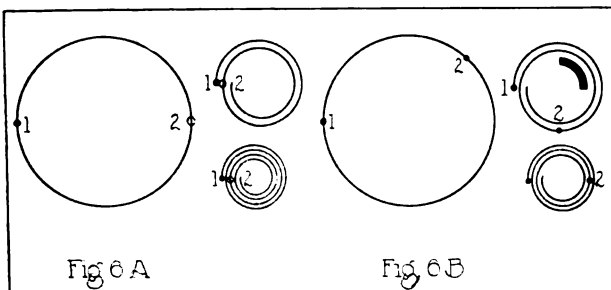


Fig. 6A

Fig. 6B

taining the crank axes, and the connecting rod system consisted of a symmetrical parallelogram of, functionally speaking, four rods, actually six rods being employed. Both crankshafts were fitted with balance weights whose function was not only to balance the rotating portions of the cranks themselves, but also to balance, on the principle already discussed, the reciprocating parts of the engine.

By an inspection of Fig. 9, it will be seen that the distribution of pistons and connecting rods at all times formed a symmetrical figure about a point A half way between the centres of the two crank pins, and so the whole motion of the reciprocating parts could be treated as a mass concentrated at the point in question with strictly harmonic motion; it could, therefore, be balanced with mathematical accuracy by oppositely rotating weights on the crankshafts. The engine was not troubled with any rocking moment, owing to the fact that the whole of its reciprocating parts had "looking glass" symmetry about the transverse vertical plane. The rotational recoil impulse was balanced completely by the reversely rotating flywheels of equal moment of inertia; the fact that these lie in two different planes is of no importance. Though the distribution of the impulses does not take place at equal angular intervals, this is without effect on the balance of the engine owing to the absence of rotational recoil—since there is no unbalanced kick it is of no consequence when the kick takes place. From a scientific point of view, probably this engine is the only completely balanced type of reciprocating engine that has ever been built.

In connection with this engine, it is of interest to call attention to a kind of vibration that may be felt, or at least may make itself appreciable, apart from any vibration of the engine proper. Let us take an engine of the type under discussion, and admitting that it is perfectly free from vibration, let us put it to work to

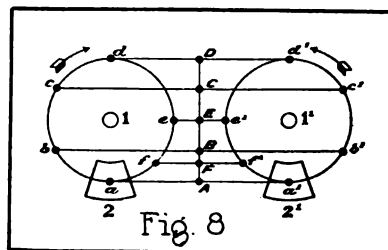


Fig. 8

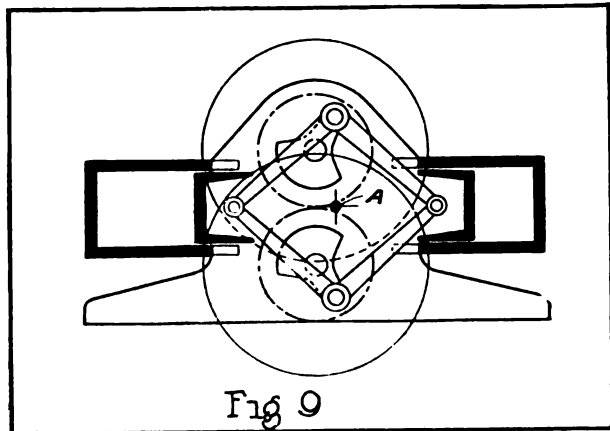


Fig. 9

ly as the popular type of engine of today, has been dealt with to some extent earlier in the paper, but on account of commercial importance of this particular type, it is necessary to devote to it more than passing attention. We have seen that the main defective balance is due to the synchronizing of the octave components of the motion of all four pistons, that is to say, the displacements of the pistons as due to connecting rod angularity all take place in the same sense, so that the forces in a four-cylinder engine tending to set up octave period vibration are four times as great as would be the case in a single-cylinder engine of equal bore and stroke. In Fig. 11 we have represented diagrammatically the movement of the gudgeon pin, corresponding positions of which are given at the "in" and "out" centres and at 90° thereto. If the connecting rods were of infinite length, all four pistons would reach mid-stroke position at the same instant, and at all other points pistons Nos. 1 and 4 would by their motion accurately compensate for Nos. 2 and 3. In an engine with a rod length of about two and a quarter times the stroke (Fig. 11), there is a considerable departure from this in the position of the pistons when they should be at mid-stroke. Thus, when the crank pin is at 90° from the in-centre, all four pistons are somewhat below their mid-stroke position; in the case of an ordinary 20 or 25 horsepower engine (R. A. C. rating) the error of position amounts to about a quarter of an inch. Let us express the length of the connecting rod in terms of the crank throw = unity, and take the ratio as 4.5; then, in Fig. 13, if a be the position error of the gudgeon pin at mid-stroke, as due to connecting rod angularity, we know that a is approximately equal to the crank throw squared divided by twice the connecting rod length, or, in the present case, one divided by nine. But the quantity a is the total amplitude of the octave vibration of the piston, hence the octave amplitude is 1/18th of the stroke. Now, since the force is proportional to the square of the periodic speed, the maximum disturbing force due to the octave

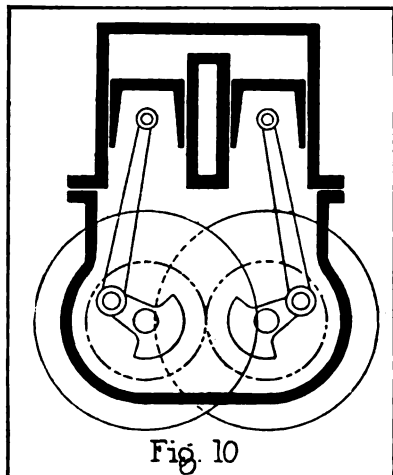


Fig. 10

components of the piston motion will be 4/18ths of that due to the main component of each piston; multiplying this again by four to represent the whole engine, we have the unbalanced force due to the octave component in a four-cylinder engine nearly as great (in the relation of 16 to 18)* as the main unbalanced piston force of a single-cylinder engine of equal bore and stroke. This comparison is given graphic-

*If the rod/throw ratio had been taken = 4 we should have had equality.

ally in Fig. 12, which represents the unbalanced forces in a four-cylinder engine in comparison with the unbalanced forces in a single-cylinder engine of equal bore and stroke, assuming the base chambers of both engines to be bolted rigidly to the foundations.

As an illustration, we may take the case of an engine of about 20 R. A. C. rating, stroke = 130 mm, running at 2000 revolutions per minute with a total reciprocating mass of 12 pounds; the maximum value of the unbalanced alternating vibratory forces under the conditions stated is approximately 800 pounds.

In addition to its defect in the matter of the secondary vibration as above, the four-cylinder engine is affected by another of the forms of want of balance to which the single-cylinder engine is liable, that is to say, the torque alterations due to piston inertia. In the four-cylinder engine the whole of the pistons are at rest at the same instant of time, and the whole have their maximum velocity at approximately the same point. Thus, as in the one-cylinder engine, there is a continual give and take of energy between the flywheel and the pistons, which results in an intermittent torque about the crankshaft axis just as has been described earlier. The magnitude of this torque in the four-cylinder engine is that of the sum of its combined elements, that is to say, it is four times as great as in the case of a single-cylinder engine of equal stroke and piston weight. The four-cylinder engine also (as in the single-cylinder) has a torque alternation due to the work done in compression and restored in expansion. This torque variation may be treated as part of the functional torque variation due to the total cycle of operations, and from this point of view the torque variations due to the compression and explosion pressures cannot be separated.

We have already seen that torques due to pressure and those due to piston inertia are actually superposed, and since in the four-cylinder engine there is a compression in one cylinder or another on every stroke of the engine, they are of

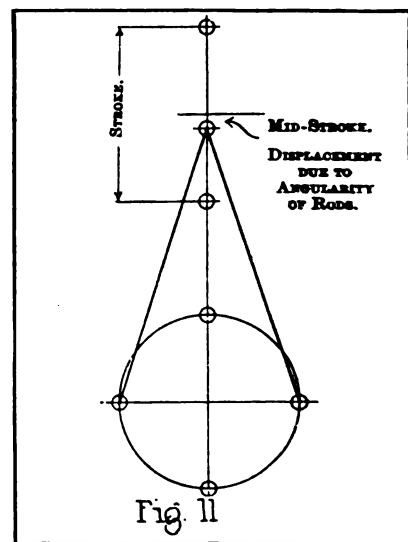


Fig. 11

the same frequency, and there are conditions of running under which these variations in some degree cancel out.

Let us suppose that powerful springs are fitted, tending to bring the pistons to their mid-stroke position; then it is evident that there is some particular running speed of the engine which corresponds to the period of the springs and piston masses, and at this critical speed no torque variation will be required. The particular speed in question is that at which the kinetic energy of the piston in its mid-stroke position is just equal to the energy stored in its spring when fully compressed, so that at every point in the stroke the total of the energy in the springs and the kinetic energy in the pistons will be constant. At this speed, since the energy of the system does not fluctuate, there will be no give-and-take of energy between the pistons and the flywheel, and so the torque fluctuations that otherwise are necessary will not occur.

Now, in fact, there is no such spring system as that indicated, but if we consider the combined effect of the four indicator diagrams, assuming the engine to run against compression only it will be seen, by referring to Fig. 13, that the combined indicator diagrams would be such as to simulate with a fair degree of approximation a straight line spring diagram, and so in an actual engine the form of vibration now under consideration will be far less apparent when running on compression than when closely throttled down, and so the spring effect of the compression is destroyed.

We have so far dealt exclusively with engines in which

the cylinder axes are in the same plane, but there are other types of engine in which the cylinders are arranged radially round a crankshaft at different points of the circumference. In some cases, as in the 80-100 horsepower Anzani, or the R. E. P. engine, the distribution of the cylinders is symmetrical, their axes being spaced at equal angles round the crank axis; in other cases only a portion of the circumference is utilized; or again in other cases, as in the ordinary V type of engine, the arrangement resembles more the "twinning" of two multi-cylinder engines whose cylinder axis planes are arranged at an angle. The latter type is best considered from the point of view of balance as two distinct engines, and the unbalanced components of the two superposed to give the resultant.

In the case of the eight-cylinder V engine (two fours), the octave disturbance can only be balanced if the angle between the cylinder planes be made 180° . Such an arrangement is considered bad owing to the fact that the working strokes cannot be properly distributed, the explosion always taking place in pairs of cylinders simultaneously. The usual arrangement for the eight-cylinder engine is for the two fours to be set at an angle of 90° , so that four impulses take place per revolution at 90° interval. In such an arrangement the octave vibration is not balanced, the resultant vibration being represented by the horizontal diagonal of a square in which the component vibrations of the two sets of cylinders are represented by two of the inclined sides, Fig. 14.

Upon investigation it will be seen that the vibration

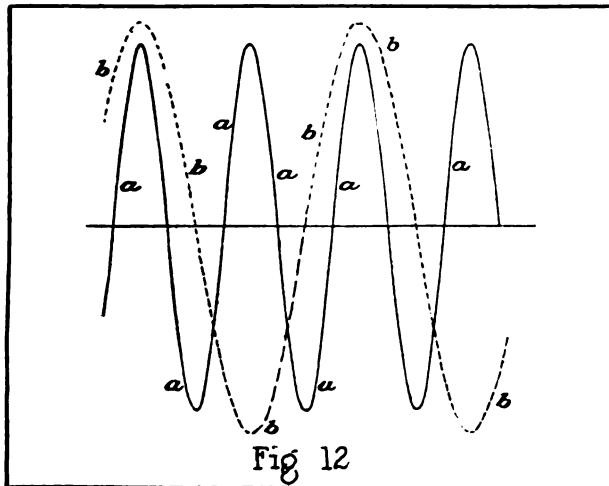


Fig 12

can be corrected by the anti-vibrator, the disposition of the rotating balance weights being that corresponding to a four-cylinder engine in a horizontal position.

In the case of a "double six" built on the V system, the angle between the cylinder axes should be either 60° or 180° ; by this means the impulses, six per revolution, can be distributed evenly at 60° intervals; the balance of such an engine requires no comment, inasmuch as each component engine is in itself balanced in respect of its fundamental and its octave vibration, and is not subject to inertia torque variation.

METROPOLITAN S. A. E. MEETS.

William M. Power Reads Paper on "General Trend of American Motor Design".

At the regular monthly meeting of the Metropolitan section of the Society of Automobile Engineers held at the American Automobile Club of America, New York City, William M. Power

read a paper on the "General Trend of American Motor Design". There was also a brief discussion on the proposed associate and student plan of membership, an advocate pointing out that there are thousands of young men in and around New York City who are either taking engineering courses or have just graduated from engineering schools, who would gladly affiliate themselves to a committee. The next meeting will be held April 30, when Finley R. Porter, formerly engineer of the Mercer Automobile Company, will read a paper on the "Influence of Racing on Motor Car Design". This will be illustrated by moving pictures of the Grand Prix and other races.

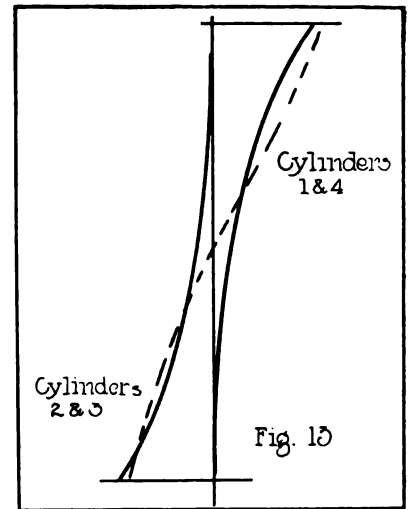


Fig. 13

QUART RIDE POPULAR.

Studebaker Dealer Utilizes an Auxiliary Tank to Demonstrate Mileage Claims.

Prospective purchasers are very much interested in the mileage possible with a gallon of fuel in these days of the high cost of gasoline. The Chester N. Weaver Company, Studebaker dealers in San Francisco, Cal., have adopted a plan which is termed the "one-quart ride". An auxiliary tank, having a capacity of one quart, is fitted to the car and the prospect is asked to fill it from his own quart measure. The ride then takes place over a measured course.

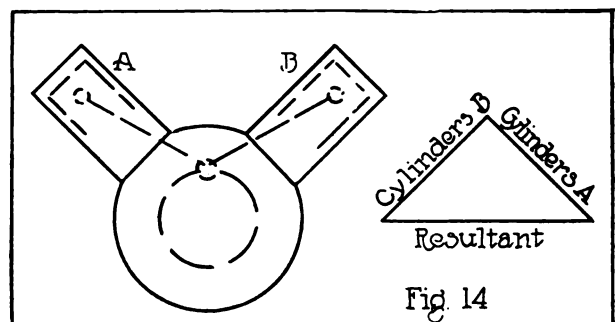


Fig. 14

CORRESPONDENCE WITH THE READER.

ANSWERED BY MAIL.

G. Watson, Cohasset, Mass. Lighting.
G. L. Brightman, Fall River, Mass. Hupmobile.
F. C. Goodale, Tlego, Cal. Lighting Dynamo.

Tire Valve—B. M. L., Des Moines, Ia.

Why is it that air leaks out of an inner tube through the valve even when it is screwed down as tightly as possible? Why is it hard to inflate one tire and easy with another?

Generally, the cause of leakage is due to dust or other foreign substances on the valve seat. Sectional views of the construction are shown at Fig. 1 and a little study will make clear the point involved. The illustration at the left shows the valve seated; that at the right its position when

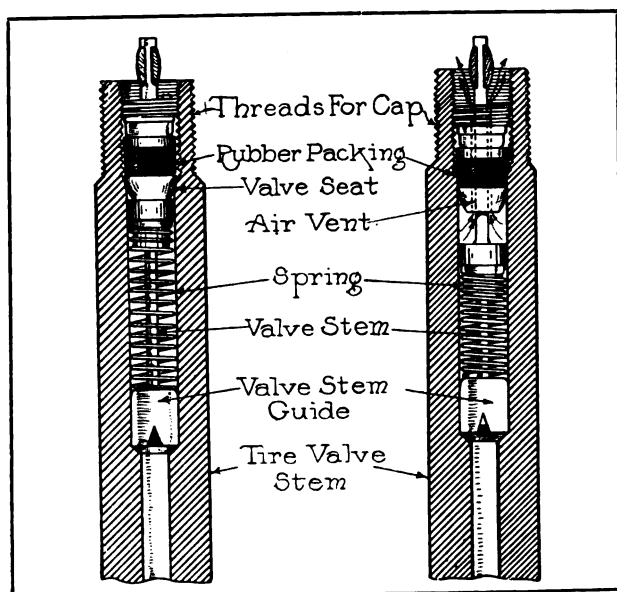


Fig. 1—Sectional Views of Tire Valve.

the plunger is depressed and air is consequently escaping. The arrows indicate the passage of the air. It will be seen that the valve is off its seat. Normally it is held closed by the tension of the spring which, with the guide, moves freely on the valve stem. As previously explained, if foreign elements prevent the valve from seating, air will escape as indicated by the arrows. The leak may be minute or slow.

The cause of hard inflation is due to the resistance set up by the spring member. If the tension is above normal, more pressure will be required to overcome this resistance and to push the valve down off its seat. The resistance increases as the tube becomes inflated and the pressure of the pump must be greater than that set up by the air in the tube to open the valve.

Many motorists make the error of screwing down too snugly the threaded member of the valve, destroying the rubber packing which is employed to prevent the escape of air. The threaded member should be adjusted lightly, and if it be loosened when inflating a tire, it will be found that the shoe can be pumped up easily. After inflation the threaded member should be adjusted and tested for leakage.

Wiring Dry Cells—N. B. H., St. Louis, Mo.

In your last issue mention was made of wiring dry cells in series and in multiple series. What is the difference and which is the better way?

The article in question dealt in a general manner with installing dry cells when placing the machine in commission after it had been stored for the winter. By wiring cells in series is meant connecting the terminal of the carbon post to that of the zinc as indicated at Fig. 2, A. This leaves two free terminals, a positive and a negative.

This method of wiring is utilized to obtain voltage. As six volts are generally necessary to operate ignition systems, and as the voltage of a cell is slightly over one volt, the wiring of six cells in series obtains the desired result. Wiring in series increases the voltage, but not the amperage. Assuming the amperage of each cell to be 20, wiring six or more in series does not increase it. It will remain 20.

If, however, the cells are wired in multiple series as shown at B, the amperage will be increased. The method consists of wiring two or more groups of batteries in series as at A and so arranging the groups that the free carbon terminals will be at one end and the zinc members at the other. The two or more positives are connected together, as are the negatives. This is plainly shown at B.

The voltage of the cells shown at B will be that of four cells wired in series, and, assuming that the voltage of each battery is 1.5, the total voltage will be $4 \times 1.5 = 6$. The amperage is increased. Figuring on the basis of 20 amperes to each cell, and that there are three groups, the total amperage obtained by the multiple series wiring is 60. For each group of four cells in series added the amperage will be increased by 20. Thus with six groups in multiple series the amperage would be 120.

The advantages of wiring in multiple series are many. A manufacturer of dry cells conducted a series of experiments, using various groups

with a motor, and operating the latter continuously until it began to miss. Five cells in series gave 20 hours' service, or 400 estimated miles. By utilizing two sets of five cells in multiple series, 70 hours of service were obtained, or 30 more than would have resulted by using two sets of five in series.

Motor Starter Trouble—T. B. Brown, Gainesville, Ga.

I have a 1914 Cadillac. When I put it up the other night it was all right, but the next morning the motor starter would not turn over the engine one little inch. Used the starting handle and the motor started. Ran the car about an hour, then tried the starter and it worked all right. It has been operating satisfactorily ever since. I would like to know where the trouble was, as it is the fourth time the trouble has occurred. I have been taking your book for some time and would not be without it, as I get some mighty good doings out of it.

The trouble referred to was probably due to the storage battery being in an undercharged condition. A battery discharged below a specific gravity of 1.150 will not crank the engine, and the gravity must be brought up by charging. The fact that the starter operated satisfactorily after the engine was run for some time would indicate that the cells were in a discharged condition. When a battery is in a properly charged condition the electrolyte should read from 1.275 to 1.300. The electrolyte is tested by a hydrometer syringe. Elsewhere in this issue will be found an article on storage batteries which will explain in detail the points involved.

If one is not familiar with the starting and lighting system, it is better to consult the expert at the service station when trouble is experienced.

Overland Steering Gear—L. M. Coleman, Hyman, S. C.

I have a model 59 Overland, the steering gear of which has lots of play, especially in the wheel. Please give me instructions for tightening it.

To properly adjust the steering gear of the model 59 Overland car it is advisable to jack both front wheels off the ground so that the linkage may be moved easily.

First, loosen the two clamping bolts at the base of steering gear, which clamp it in a rigid position. By turning the notched adjusting nut at the top of the steering gear housing, and at the bottom of the outside tube, to the right, all end motion is eliminated.

Next, turn the steering wheel around as far as it will go and adjust the worm gear by turning the adjusting collar next to the steering ball arm. The worm gear shaft is within an eccentric bushing, and, by turning this collar, all lost motion is taken up between the gear teeth. It is important that this adjustment should be made on the extreme, as all steering gears wear more in

the centre on account of being used most in the straight ahead position when driving.

If lost motion exists after making the above adjustment, and there is considerable play in the centre, it will be necessary to remove the ball arm from the worm gear shaft and turn the steering wheel 1.5 times around. This will present a new surface, of which there are four, to the worm. There are practically three adjustments to the steering gears utilized with the Overland cars, and if properly lubricated the wear will be very slight.

Magnetos—Le Moyne Thomas, Richwood, O.

Please inform me as to the exact position of the armature or core in the common horseshoe type of magneto when the greatest current is generated, and where the safety spark gap is located in the new Bosch and Splitdorf magnetos and how to adjust it. How should you go ahead to remove the condenser from a magneto without injuring it?

The current generated by a magneto of the permanent magnet type is at its maximum when the greatest number of lines of force is cut, or

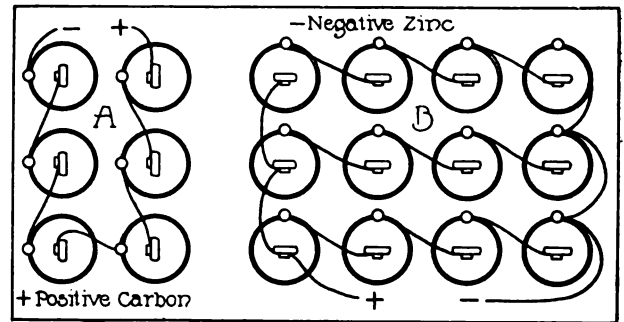


Fig. 2—Wiring Dry Cells: A, in Series to Obtain Voltage; B, Multiple Series to Obtain Amperage.

approximately after the armature has attained one-eighth revolution, or 45 degrees of travel.

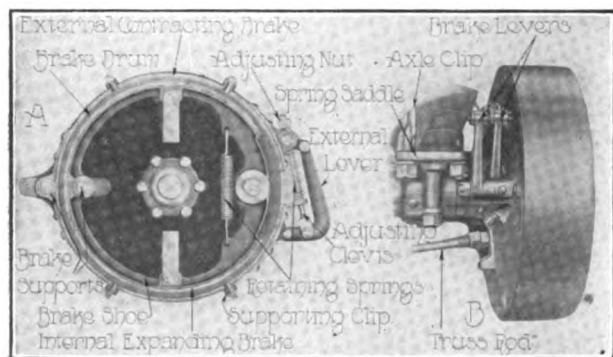
With the new types of Bosch and Splitdorf magnetos the safety spark gap is enclosed and will require no attention, as it is adjusted properly at the factory.

Relative to the condenser: The writer would not attempt to remove it and it should not be tampered with. It is enclosed and if it be suspected of being the cause of ignition trouble, the magneto should be sent to the factory or the nearest service station. In the Classified Buyers' Guide will be found the lists of service stations maintained by the magneto manufacturers.

Unless one is an expert on magnetos he should not attempt to disassemble an instrument. Complete instructions as to what may be done by the owner are given elsewhere and, as pointed out, the directions of the maker should be followed to the very letter. The majority of magneto troubles are held by the manufacturer to have been caused by tampering.

OVERHAULING THE BRAKE ASSEMBLY.

AS THE safety of the occupants of the motor car depends upon the efficiency of the brakes, the inspection and restoration of worn



Showing Components of External and Internal Types of Brakes.

linings, linkage, etc., cannot be too carefully performed. It is decidedly better to slight other repairs than to economize on these members, as good brakes afford excellent insurance against accidents.

Aside from a knowledge of the steps necessary in relining the bands, the work of placing the brakes in first class condition does not require any great skill, as the linkage and mechanism are not complicated and a little study will enable one to become familiar with the design, as well as any faults that may have developed after considerable service.

With very few exceptions the brakes are fitted to the rear wheels of the machine, although the use of the propeller shaft brake is noted in one or two modern high grade cars. It is the practise to employ two sets with the sliding gear transmission; service members, generally operated by a pedal, and emergency, actuated by a hand lever, although some makers eliminate the lever, utilizing the clutch pedal to actuate the service members. With this form a partial depression of the clutch pedal disengages the clutch, and a further movement applies the brakes.

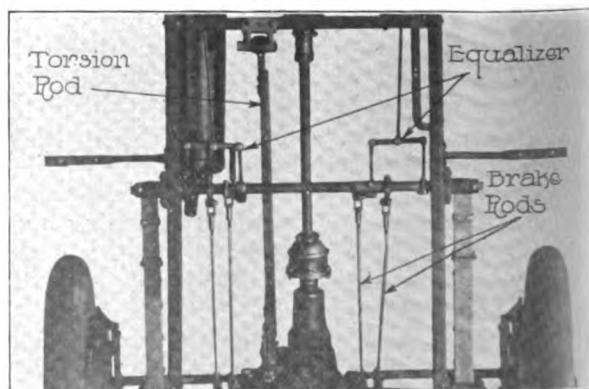
Brakes may be divided into two general classes, the external contracting and the internal expanding. The principle of the former is the use of a band faced with a friction material, which, when contracted by suitable mechanism, grips the drum of the wheel. The other design consists of a band within the drum, which is expanded by means of a cam. Both types are actuated by levers connected with the operating means by linkage.

Conventional designs of internal expanding and external contracting brakes are shown in an accompanying illustration with their components lettered. It will be noted that the external brake encircles the brake drum, and is made in two sections; that is, is split. It is pivotally mounted, as shown at A, while diametrically opposite the halves are linked by a lever. As shown in the drawing, this lever is in its normal position and the lining is not in contact with the drum. Upon the lever being moved outward, the ends of the band are drawn together, resulting in the friction material gripping the drum. The expanding brake, usually utilized for the emergency, is actuated by a lever which when moved forward spreads the halves of the band.

To inspect the internal types, the wheel will have to be removed and it is best to jack up the rear axle, making sure that the forward wheels are chocked, so that there will be no danger of the axle slipping off the jacks. If the equipment does not include two jacks, raise one wheel and block up the axle, taking care not to have any weight come upon the strut rods, or springs.

First remove all old lubricant. Many times the failure of the brakes to grip properly is due to grease working out from the differential onto the linings. If this be the case, it will be well to displace the axles and fit new washers, as new friction material will not improve conditions.

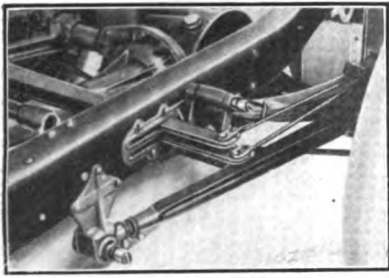
After thoroughly cleaning the bands, etc., test the retaining spring of the internal brake. It may be that it has lost its elasticity, causing the friction material to drag. Either fit a new spring or



Clean and Lubricate Equalizers and Linkage of Brake System.

shorten the old member. Examine the springs and supporting clips which maintain a space between the friction material and the surface of the

drum. All moving parts, such as the lever connections, spring saddles, adjusting nuts and bolts, should be thoroughly cleaned, as more or



The Radius Rods Require Careful Attention.

less mud collects on these members. If any are badly worn, replace with new, lubricating all working parts.

If the brake linings are worn to the rivets, new fac-

ings will be necessary. The friction material comes in different widths and thicknesses. Before purchasing, ascertain the proper size to use and measure the drums. If one is careful in this work, or consults the agent of the car, no trouble will be experienced.

To reline the brakes the bands will have to be displaced. Clamp them in a vise and by using a sharp, cold chisel the heads of the rivets can be cut off easily, after which the remaining part of the rivets can be driven out with a punch. Place the new lining around the band, and cut to approximately the correct length. Next clamp one end of the lining to the band, taking care that it is parallel with it, drill the holes and countersink them. The novice generally makes the mistake of not countersinking the holes deep enough. In performing this work make sure that the head of the rivet is well below the surface of the lining. The rivet is then driven home and the small end peined over. This operation is repeated until all the rivets are in place. The lining should be drawn tightly over the band and be free from wrinkles.

Before replacing the wheels, clean and inspect the equalizers and all linkage, also lubricate all parts subject to friction. Test the brake pedal spring to note if it works freely. An excellent lubricant for all brake linkage is grease mixed with powdered graphite.

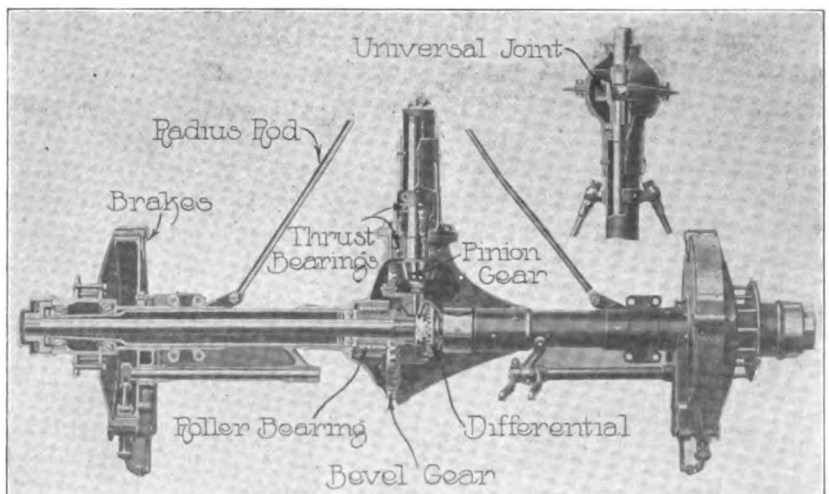
After assembling the brake mechanism, it generally will be found that trouble is experienced in replacing the wheels, owing to the ad-

justments that have been made to compensate for wear of the old lining. It is a good plan to release all linkage until the wheels are replaced, then readjust. After the work is completed the brakes should be tested to note if they grip evenly, and this may be determined by a gradual application and turning each wheel. During the first trip or so with the car, place the hand on the drums and note if they heat. If so, it denotes dragging, which should be corrected. Newly lined brakes will require a little attention for the time being, such as minor adjustments.

Coming next to the rear axle: There is not much that the owner can do except to clean out the old lubricant from the differential, wash with gasoline and refill with fresh lubricant. The differential should be examined for play and, if any exists, adjusted according to the instructions of the maker. End thrust may be present in the drive shaft, causing the pinion gear to mesh too deeply with the large gear.

Radius and torque rods are important and should be inspected carefully, as too much lost motion will result in undesirable stresses upon the driving mechanism. Remove the boots from the universal joints, clean and examine these members very carefully. It is possible that these may be badly worn and if they cannot be re-bushed it is best to purchase the parts needed. Repack with new lubricant and fit new boots if necessary.

Strut rods should receive attention, for if they be loose or too tight, they are likely to break



Part Sectional View of Conventional Type of Rear Axle and Components That Should Not Be Overlooked in the Overhaul.

when traversing uneven roads. In adjusting, set them up snugly. Go over all riveted components and note if any are missing or loose.

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APPLYING BUSINESS METHODS.

The purchaser of an automobile, or a watch, may be pardoned for attempting to secure all he can for his money, but there is no real reason why one transaction should be conducted on a different basis than the other. It may have been necessary, once, to convince the prospective purchaser that a watch would keep time. That day has passed. The general public has become convinced that the watch is a practical invention.

The man who desires a watch, today, selects one which best meets his needs, pays the price which is asked and takes possession of his property. Accompanying the watch is a certain guarantee as to workmanship and material, but this is taken for granted and there is no attempt to influence the salesman to undertake additional obligations.

The automobile industry has passed the experimental stage, insofar as it has been amply demonstrated that cars will run and serve a useful purpose. The owner and prospective owner have had every opportunity to inform themselves as to the respective merits of machines selling at various prices. They know what to ex-

pect of a given product. They know also that the manufacturer guarantees his product within certain limits.

Instead of being content, however, with the purchase of a car, as would prove true with respect to the watch, the average man seeks something in addition. Automobile dealers who have given the subject thoughtful consideration have arrived at the decision that it is this something additional which may mean their success or failure. The demand and the granting of the demand are relics of the past—a result of conditions for which dealers and purchasers alike are responsible.

The time has come when those engaged in the production and sale of automobiles—passenger cars in particular—must adopt methods which are regarded as essential in other lines of business endeavor. The period may be termed one of readjustment, but by whatever name it is called, the prospective purchaser is the one who will reap the largest benefit by the change. Manufacturers who have adopted strictly business methods, and who insist that their dealers shall follow their example, are those who are giving their patrons the most for their money. Automobiles should be bought—and sold—on the same basis as any other piece of merchandise.

TARIFF AND IMPORTS.

While it may still be too early to determine just what effect the new tariff is to have upon the importation of automobiles, eventually, it is of interest to note that the number and value of cars brought into this country has been decreasing steadily since the law went into effect in October. In February, the last month for which the government figures are available, the value had dwindled to \$20,575 as compared with \$82,119, for the same month a year ago.

The number of cars imported during October, 1912, was 78, compared with 29 for the same month in 1913. Since this was the first month of operation under the new law, it seemed desirable to await further developments before making comment. In November the figures were 87 and 37 for the two years; in December, 87 and 38; in January, 71 and 12, and in February, 33 and nine. Evidently, the tariff is to have some effect upon the importation of cars.

IGNITION CARE AND ATTENTION.

Directions Enabling the Motorist to Clean, Adjust, Time and Lubricate the Magneto—Suggestions for Inspecting Systems Utilizing Batteries, Coils and Timers.

(By C. P. Shattuck.)

AS THE efficiency of the motor depends largely upon the ignition, the system should be given a thorough inspection in the overhaul of the car, and all components of the magneto, distributor, commutator, coil, switch, etc., cleaned and adjusted. Failure of the motor to develop its maximum power, difficult starting and a decrease in the number of miles formerly obtained to a gallon of fuel, are generally due to the ignition system requiring a minor adjustment. When it is considered that the mixture within the cylinders must be as completely burned as possible to obtain the maximum energy of the explosion, and that the spark must occur at a predetermined instant, the importance

cleaning the power plant, cover the magneto and be careful not to spill the cleansing fluid over the wires, etc. It will not be necessary to displace the instrument to inspect the parts that may require adjusting or cleaning, but if it must be removed for any reason, make a diagram of the wiring plan, and note the direction of rotation of the distributor and the original factory setting. If these facts are given in the instruction book, a sketch will not be necessary.

A simple method of insuring correct replacement of all leads and connections is to tag each wire and terminal. If not sure of the firing order of the motor, displace the distributor cover of the magneto and crank the motor until the distributor brush rests on the segment with which the cable leading to the No. 1 cylinder is connected. By tracing the wires from the other segments to the plugs, and observing the direction of rotation of the brush, the firing order will be noted easily. Fig. 9 illustrates the point involved, and it will be seen that the distributor rotates clockwise. It should be borne in mind that in all magneto setting, timing, etc., the distributor rotates in an opposite direction to that of the armature shaft.

Fig. 1—Showing Components of Magneto That May Be Cleaned and Adjusted by the Motorist.

of placing the ignition system in an efficient condition will be appreciated.

Dealing first with the magneto: There is no reason why the motorist cannot clean and adjust the instrument, for the work does not involve a technical knowledge of its components or their operation. It requires very little attention, and if the motorist will lubricate according to the instructions of the maker, clean and keep the contact points adjusted, no trouble will be experienced. On the other hand, tampering with the instrument will result in loss of service of the car while the magneto is being repaired at the factory, and considerable expense.

By observing a few simple precautions when overhauling the motor, the owner-repairman can eliminate the expense of the magneto expert. In

The first step in cleaning the instrument is

to remove all foreign deposits from its exterior, using a cloth moistened with gasoline. Next examine the Oldham or other form of coupling connecting the driving

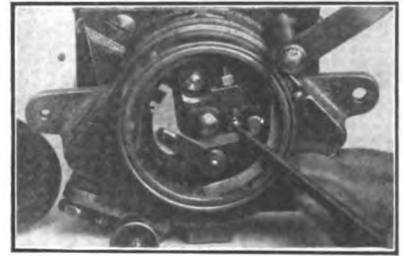


Fig. 2—Showing Platinum Contact Points of Magneto Which Interrupt the Primary Current.

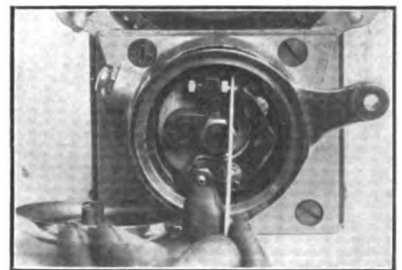
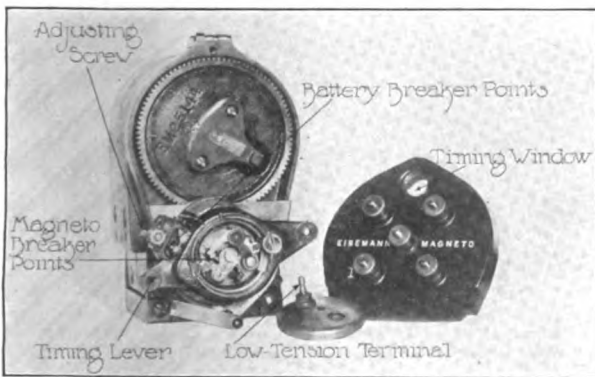


Fig. 3—In Cleaning Contact Points Use a Very Fine File.

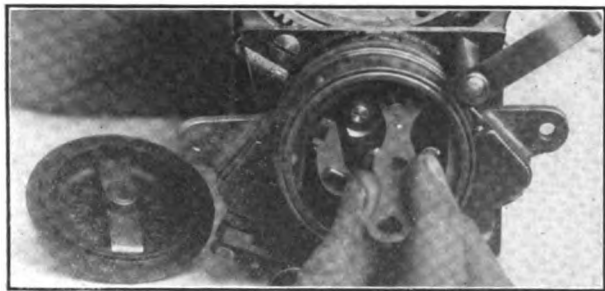


Fig. 4—To Adjust Contact Points, Loosen Locking Nut of Long Platinum Screw and Use Wrench as Shown.

shaft with the armature shaft. It is possible that the coupling may be badly worn and if so it is best to replace with a new one. The practise today is to employ flexible and adjustable couplings which may be obtained from magneto manufacturers and supply houses.

To displace the distributor cover or housing, it may be necessary to remove screws or disengage the holding springs, depending upon the make of instrument, and a little study will determine the method of retention. To clean the distributor, moisten a soft camel's hair brush with gasoline and wipe out any carbon or foreign elements that may be present. Do not attempt to improve the tension of the distributor brush spring, as it was properly adjusted at the factory. Lay the distributor cover to one side and take off the interrupter housing, or dust cover, as it is termed by some makers.

This is located under the distributor and is generally retained by a spring lever which can be slipped to one side. With the Bosch magneto, such as shown at Figs. 4, 5 and 6, the cover snaps out and into place. The Eisemann and Splitdorf instruments, shown at Figs. 1 and 3, as do some types of the Bosch, employ a spring lever.

Having displaced the cover, clean the interrupter mechanism with the brush moistened with gasoline and be very thorough in the work. The next step is to inspect the platinum contact

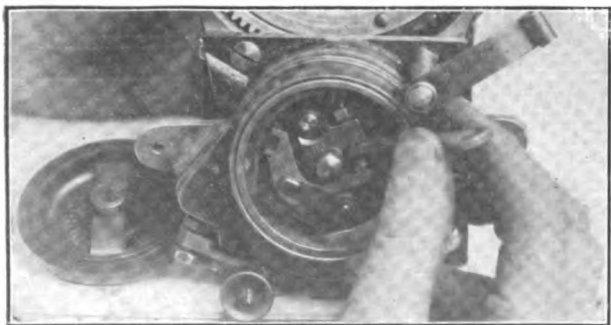


Fig. 5—To Decrease Gap at Contact Points Turn Adjusting Nut to the Left.

points indicated by the pointer at Fig. 2, and if the armature shaft is turned until the fibre block rests, as shown in the drawing, the points will be separated. In explanation it may be stated that this block causes the points to break, and as many times in each revolution of the shaft as there are cams in the housing.

If the points are pitted or burned, clean and true them with a fine jeweller's file, holding the file as shown at Fig. 3, a method that will insure even surfaces. It is possible that the thickness of the file will be such as to make necessary increasing the gap temporarily. To do this, employ the wrench accompanying the magneto and loosen the locking nut, as shown at Fig. 4, turning it to the left. With this nut loose, place the wrench on the nut on the long contact screw as shown at Fig. 5, and turn the screw in the same direction as the locking nut was rotated. This will increase the gap between the points. In filing, be careful not to remove too much of the platinum—just enough to clean the points—and

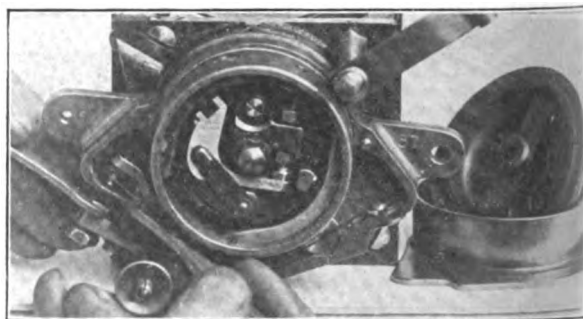


Fig. 6—Showing Method of Adjusting Points of Battery Breaker Mechanism and How Gauge Is Utilized to Obtain Correct Gap.

the fibre block should not rest on a cam during the work.

After truing the points, readjust them. Turn the armature shaft until the fibre block rests on a cam and, with the points fully separated, insert the gauge as shown at Fig. 6, which illustrates testing the gap of the battery breaker contact points. The gauge should fit snugly, yet fairly freely. If the space is too large—which it will be if the points have been filed—use the wrench as shown at Fig. 5, but turn it to the left to decrease the space. After obtaining the correct gap, set up the locking nut tight. Next rotate the armature shaft and note if the points meet and break properly. This hint will be of value if magneto trouble is experienced on the road, and it should be remembered that with those types utilizing the one breaker mechanism to interrupt both the battery and magneto current, fail-

ure of the parts to operate properly means that a spark cannot reach the plugs.

Too much emphasis cannot be laid upon the instructions of the maker as to lubrication. Each part requiring lubricant is marked "Oil", and do not assume that if a little oil is useful a large quantity will be better. Magnetos have been spoiled by too much lubrication. The interrupter and distributor should be oiled only when so specified by the maker, and as a general rule breaker mechanisms utilizing fibre in their construction must not be lubricated, as oil swells the fibre.

If the magneto has been removed from the motor and it is necessary to retime it, it is best to obtain the timing from the factory or agent of the car. Some car makers provide for considerable lead, and others a slight advance, according to the engine and make of magneto. The best setting is determined by the manufacturer and it is rarely that the original setting can be

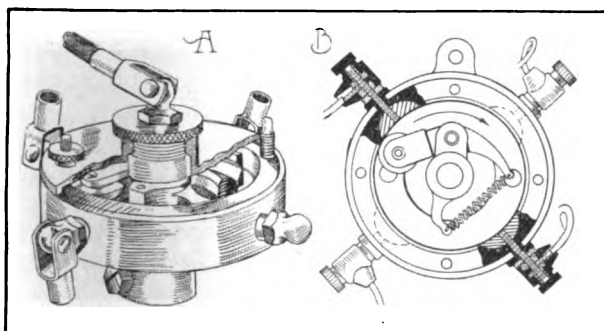


Fig. 7—Distributors and Timers Should Be Cleaned, Lost Motion Eliminated, and Lubricated.

improved. Timing may be accomplished by utilizing the piston or crank circle. When the former is employed the method of procedure is to bring the piston up to nearly dead centre or fully complete the compression stroke, according to the timing plan. Then connect the armature shaft with the driving member, when the contact points are just beginning to separate. Of course the distributor arm should be on the No. 1 segment. When the magneto is provided with a timing window its setting is greatly simplified.

It is a good plan to go over the magneto and note if any of the screws securing the magnets to the pole shoes are loose. If so, tighten them. The high and low-tension wires, especially the former, should be inspected for broken or chafed places, and if the cable is old replace with new. Solder all new terminals utilized and make sure that all of the strands of copper wire are soldered in place, as one of these members may cause a puzzling short circuit. Particular attention

should be paid to the ground wire, that lead connecting the circuit breaker box with the switch. If the wire be old, replace with a new one, as,

should the strands come in contact with any metal, a short circuit would result, making starting and stopping of the motor difficult, according to the type of magneto employed.

Commutators and distributors are employed on some cars, using a battery or a generator as a source of current supply. These should be well cleaned with gasoline and their components carefully inspected for lost motion and wear. If the contact blocks, roller and fibre ring of the timer are badly worn, they can be trued up in a lathe, but if the bearings are not adjustable it will be cheaper and more satisfactory to fit a new one. The same remarks may be applied to the distributor. If found to be in good condition after cleaning, lubricate with a good grade of light oil. Timers should be washed out with gasoline from time to time and oiled, as more or less foreign elements collect, setting up a resistance to the passage of the primary current and imposing an unnecessary drain upon the batteries.

Coils employed with the battery system will require attention. The platinum contact points of the vibrator and adjusting screws will require cleaning and adjusting and it is possible that some of the connections will need replacing with new, as well as tightening the old members. Test the dry cells and if any fail to register at least 10 amperes, throw them out and purchase new ones. In installing new batteries pack them in snugly in the container. In inspecting and adjusting the ignition system, do not hurry the work, as time gained by haste may be lost in tracing troubles on the road.

Relative to storage batteries utilized for ignition purposes: If they have been stored for the winter or not used for some time, it is best to take them to a capable battery man and have them given a long, slow charge. They may need slight repairs.

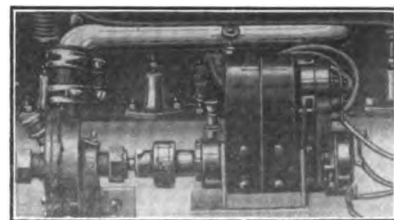


Fig. 8—Examine Oldham Coupling for Lost Motion.

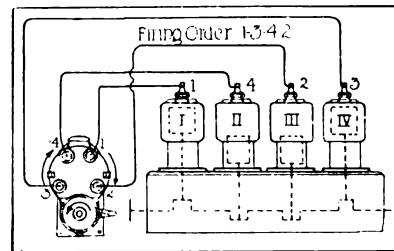


Fig. 9—Wiring Plan of Four-Cylinder Magneto.

WITH THE MOTORING INTERESTS ABROAD.

Ulster Volunteer Force Attracts Decided Attention by Its Use of Automobiles in Mobilization Work--New Low Priced Swedish Car--Foreign Notes.

AMERICANS will undoubtedly be interested in learning that the automobile has played an important part in the action of the Ulster Volunteer Force in resisting the proposed Home Rule bill for Ireland. The success of the plans carried out under the direction of Sir Edward Carson, insofar as this applies particularly to the use of motor vehicles, has been such as to occasion no little favorable comment on the part of British motoring prints, and it is strongly hinted that regular army officials may do well to consider the advisability of adopting similar tactics.

The basis of the organization of the Ulster force is locality. It was created by the members of the Unionist clubs, which sprang up all over Ulster. Commanders of companies were appointed, the companies were divided into squads, and each squad chose its own leader. The squads were composed of volunteers living close together—neighbors, in fact—so that when mobilization is ordered the battalion commander tells his company commanders, who notify the squad leaders, who, in turn, go around to their neighbors. In this manner the entire company and battalion are mobilized in the shortest possible time.

At the same time that this system was being formulated, motor car owners all over Ulster were also being organized by a similar system. At first, volunteer automobile owners were called upon only to assist in the distribution of imported arms and ammunition, and it was almost entirely through their efforts that the contraband materials found their way to the different units of the volunteer body. In the meantime, the dispatch riding corps, composed of volunteer motorcyclists, was organized.

Each district now has its motor car company, divided into sections with a section commander, who is relied upon to turn out with his section of four or five automobiles and act under a company commander responsible for 40 or 50 cars. Practise mobilizations have been held until it is now possible to assemble rapidly at a given place, pick up from 100 to 200 volunteers and transport them to some distant locality where field manoeuvres are carried out, and return them to the original place of assembly. While this much of the plan has received publicity, additional information is not available, although

it has been made to appear, at least, that these motor car companies are able to concentrate members of the volunteer force at any particular spot with a celerity far beyond that of cavalry.

Of course it will be admitted that the mobilization of a volunteer army in times of peace is quite a different matter from transporting an army under actual warfare, but it is suggested that it would be possible to convey forces long distances at the speed of from 25 to 35 miles an hour, by automobile, without the delays attendant upon the use of railroads.

In arranging the plans in Ulster, each commander undertakes to convey a certain number of men, which is generally a little below the total capacity of the cars on his list. This is expected to leave a margin for accident, or for intentional damage to cars by the enemy's forces.

SUNBEAM SECURES RECORDS.

Chassagne Lowers Burman's Speedway Marks for Half Mile, Mile and Two Miles.

Robert Burman still holds the world's straight away free-for-all records for the half mile, mile and two miles, but the speedway marks for these distances were exceeded by Chassagne in a 12-cylinder Sunbeam car on the Brooklands track, Weybridge, England, March 25. The time made by Chassagne is not recognized as a world's record abroad, since it was not registered as the mean time out and back, as required under the new rules. For that reason it is probable that Burman will still hold the speedway marks for the half mile and mile, secured by him in the Blitzen Benz at Indianapolis, May 29, 1911, and Bragg will retain the two-mile mark set by him with a Fiat at Los Angeles, April 13, 1910.

Chassagne's time for the half mile was 15.17, as compared with Burman's 16.8. His time for the mile was 29.82, while Burman's was 35.35. The two miles were covered at Brooklands in 1:00.31, while Bragg drove his Fiat the same distance in 1:15.96.

The six-cylinder Sunbeam was constructed by its English maker for the purpose of striving for the world's straightaway records held by

Burman. It was expected that the test would be held somewhere on the Continent this month, and this plan may yet be followed. Chassagne is entered as a Sunbeam driver at the forthcoming 500-mile race at Indianapolis, Memorial Day.

WILLYS UTILITY ABROAD.

Flying Squadron of Police Finds American Built Chassis Meets Every Need.

It is seldom indeed that British municipalities depart from what appears to be an unwritten law with respect to goods made in Great Britain. It is therefore somewhat surprising to learn that the police department in Leeds, England, has been using a specially equipped Willys Utility chassis, made by the Willys-Overland Company, Toledo, O., and with such success that English newspapers felt constrained to state that the men assigned to this vehicle were particularly efficient in the discharge of their duties.

The 16 policemen shown in an accompanying illustration composed a "flying squadron", assigned to special duty in Leeds during the recent industrial strike in that city and vicinity. For three weeks they were on duty night and day, ready for instant transportation to any quarter in which trouble might occur. Of course the machine was subjected to the same requirements, and it was almost constantly employed in rushing the officers from one part of the city to another. The success which attended this initial use of an American machine for such work is expected to result in increased business for this type of vehicle.

SWEDEN FIGHTS "INVASION".

Company Organized to Produce Low Priced Car in Competition with America.

It has been stated in these columns that the low priced American car was decidedly popular in Sweden and Norway, and it is not surprising, perhaps, to learn that a company has been organized in the former country to produce machines which shall compete directly with this

class of vehicles. The new car is to be rated at 20 horsepower and it is announced that it will sell for less than \$800.

The factory will be located at Norrköping, and it is stated that the company has strong financial backing. The technical manager is the well known Belgian expert, Vivinus. It is added that the first models will be ready for the market in the autumn.

NEWS NOTES FROM ABROAD.

Of the 34 cars that left Paris on the Tour de France reliability trials last month only 13 returned. A combination of heavy roads and many storms did much to discourage the contestants. At the conclusion of the tour a 67-mile road race was held over the Sarthe circuit at Le Mans, this being won by the Pierron. The cars which finished the trials were: Buick (two), Barre (two),



Willys Utility Chassis Utilized by Flying Squadron of Police During Recent Strike Riots in Leeds, England.

Aquila Italiana (two), Pierron, Gregoire, Buggati, Georges Roy, Phenix, Zedell and Hispano Sulza.

The list of entrants for the French Grand Prix was increased by two names before the final closing date, at double fee, March 31, so that the total is now 41 instead of 39. The late entries were made by a Caesar and a Nazzaro. The race will be held July 4.

Twenty-four cars have been entered for the 1914 Tourist Trophy race over the Isle of Man circuit, June 10-11, as follows: Minerva, three; Humber, three; Straker-Squire, two; Sunbeam, three; Star, two; Vauxhall, three; Martini, one; Adler, three; D. F. P., one; S. A. V. A., one; Crossley, one, and an unnamed machine entered by A. Rawlinson.

The Irish Automobile Club is planning a reliability trial for light cars, weighing not more than 1500 pounds, which will be held in the vicinity of Dublin during the last week in May.

The Imperial Automobile Club of Austria, working in conjunction with the automobile clubs in Styria, Tyrol, Carinthia and Trieste, has decided upon the route for this year's Alpine tour, which starts from Vienna, July 11, and will occupy eight days with night stops and daily mileage as follows: Klagenfurt, 234; Trieste, 229; Toblach, 240; Meran, 231; Innsbruck, 113; Villach, 228; Salzburg, 241; Vienna, 239. The total mileage is 1755.

INTERESTING MILEAGE RECORD.

Cadillac Car Has Covered 200,000 Miles in Five Years, Averaging 109 Miles a Day.

According to the report of the City Messenger Service of Binghamton, N. Y., a Cadillac car, made by the Cadillac Motor Car Company, Detroit, owned by that concern, has covered 200,000 miles during the past five years. This means that the machine has been driven an average of 40,000 miles a year, or 109 miles a day. The record is one which must be considered as extraordinary in every respect.

The City Messenger Service utilizes the car for parcel delivery, and at times it serves the purpose of a taxicab. Four different drivers are now engaged in operating it under varying shifts. It is stated that 25 inexperienced men have been taught how to operate it, and in spite of this the

Century race, for cars under 450 cubic inches, at approximately 100 miles, will be held July 3, and a purse of \$1500 is to be divided into four prizes. The Golden-Potlatch trophy, for cars under 600 cubic inches, will be run July 4 over a distance of approximately 200 miles. On the same date will be run the Montamarathon Trophy event, a free-for-all contest at 250 miles. Prizes aggregating \$3500 will be offered in the Golden-Potlatch race and \$5500 in the Montamarathon Trophy event.

COLE CAR AND PHYSICS.

High School Students also Learning How Automobiles Are Put Together.

As stated in these columns recently, high schools and colleges throughout the country have been making use of the automobile in teaching the subject of physics. An accompanying illustration shows Assistant Chief Engineer M. B. Covert of the Cole Motor Car Company, Indianapolis, Ind., giving instruction to a class of high school pupils in that city.

The students in many schools are using a Cole chassis with which to impress practical points upon their memory, and engineers from the Cole factory are lending assistance by personal instructions and in answering communications from students. President J. J. Cole

also is furthering the movement, by supplying teachers with copies of the Cole Technical Bulletin.

By this method the student not only gains a knowledge of the basic principles of physics, by an application of the automobile to the study, but he obtains inside information regarding the automobile. He is shown how the car is made, what each part has to do, and their relation to each other. It is suggested that as a result many of the high school pupils are given a better opportunity of knowing an automobile than is afforded the average motor car owner.

About 120 automobiles, representing 25 standard manufacturers, paraded the streets of New Haven recently to mark the opening of Automobile Week, the first of its kind ever held in the New England States.



Teaching Physics with Aid of a Cole Chassis in Indianapolis High School.

working parts, with few exceptions, are said to be those which were fitted originally at the factory.

TACOMA ENTRY BLANKS ISSUED.

Three Long Distance Events Scheduled for Two-Mile Track in July.

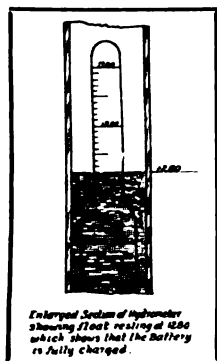
Entry blanks for the initial meet on the new speedway at Tacoma, Wash., July 3 and 4, have been issued and show that there will be distributed among the successful drivers at the Montamara Festo races, \$10,500 in prize money. Work on the new two-mile course is progressing rapidly, and it is expected that it will be ready for practise May 1. The course has an asphalt surface and is from 30 to 60 feet wide.

Three events will be run. The Inter-City

CARE OF LEAD STORAGE BATTERIES.

AS THE satisfactory operation of the electric motor starter depends wholly upon the storage battery, it is important that the owner follow carefully the instructions accompanying each equipment. That section of the instruction book dealing with the care and attention of the cells should be read very carefully and the suggestions as to testing the electrolyte with a hydrometer syringe complied with. Failure to do this is likely to result in the motor starter refusing to crank the engine, and the lighting system may also be affected.

The first step for the new owner is to purchase a hydrometer syringe, two types of which are shown in an accompanying illustration. Another view shows an enlarged section of the reading scale, which is floating in the electrolyte. The latter is taken from each cell by compressing the rubber bulb. The reading on the graduated stem of the hydrometer at the point where it emerges from the solution is the specific gravity of the electrolyte. After testing the fluid is returned to the cell.



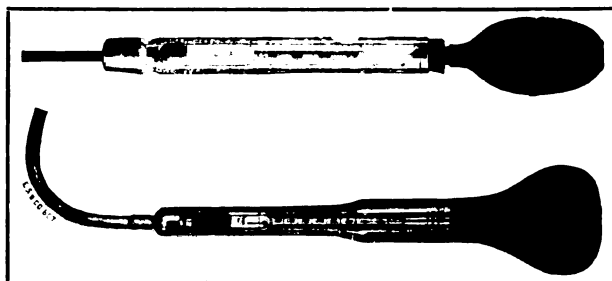
Enlarged Section of hydrometer showing float reading of 1.280 which shows that the battery is fully charged.

If the cells are in good condition the gravity will test about the same or within 25 points of each other. Gravity below 1.200 indicates that the battery is less than half charged and it should be used sparingly until the gravity is restored to at least 1.250. When it is below 1.150 it indicates a completely discharged condition and should be given a full charge. The gravity should be between 1.275 and 1.300 when the cells are fully charged. It should be borne in mind that acid should never be added to bring up the gravity. This is accomplished by charging.

One of the most important factors to be considered is that of maintaining the solution above the plates and to the height stated by the maker. This is indicated by an arrow in an accompanying illustration. Never add ordinary water. Use distilled, which is inexpensive and obtained from any service station. In connection with the addition of water: It should be done after readings of the electrolyte have been taken, as a reliable gravity test cannot be made until the water has become well mixed with the solution by charging the cells or running the car.

If for any reason the cells require an extra

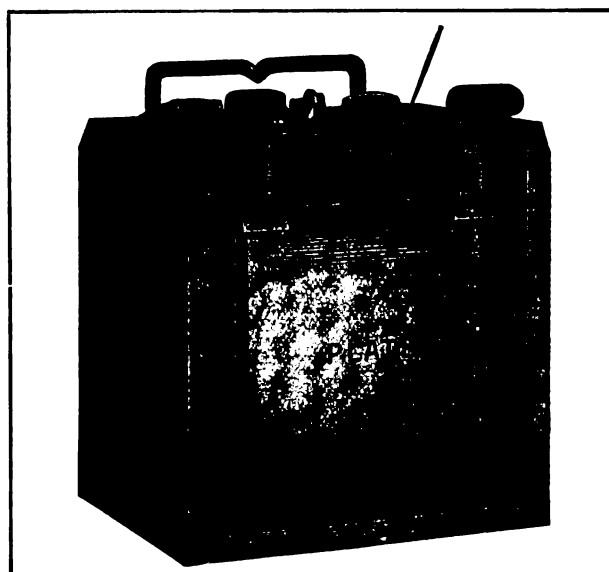
charge it may be accomplished by running the engine idle or by removing the battery from the car and taking it to an expert. There are times



Two Types of Hydrometer Syringe Utilized for Testing Electrolyte of Storage Batteries.

when the condition of the cells is such that a long, slow charge at a low rate is necessary and this work is best performed by a capable battery man. A battery that fails to hold the charge can generally be placed in a serviceable condition by a long, slow charge, but the owner must not expect that it can be done over night. The battery should be left with the service station until the expert in charge is satisfied that it is in an efficient condition. It is more economical to hire a battery while the work is being done than to spoil a good battery by insisting that the charging be hurriedly performed.

The battery and its compartment should be kept clean and dry, and the terminals and connections coated with vaseline. If solution has been spilled, wipe up with waste saturated with ammonia to neutralize the effect of the acid.



Showing Construction of Storage Battery—The Arrow Indicates Proper Level of Electrolyte.

IN THE COMMERCIAL VEHICLE FIELD.

Two New Water-Cooled Models Supplement Air-Cooled Line Produced by Chase Motor Truck Company--Details of New Signal Delivery Wagon from Detroit.

ANOTHER company which has hitherto been known throughout the industry as a producer of commercial vehicles utilizing an air-cooled motor and which has added models equipped with water-cooled engines is the Chase Motor Truck Company, Syracuse, N. Y. The light delivery wagons will be continued with the three-cylinder, two-cycle, air-cooled motors, but to this line have been added two water-cooled models, one with rated capacity of 3000 pounds and the other of three tons. The larger machine is illustrated herewith.

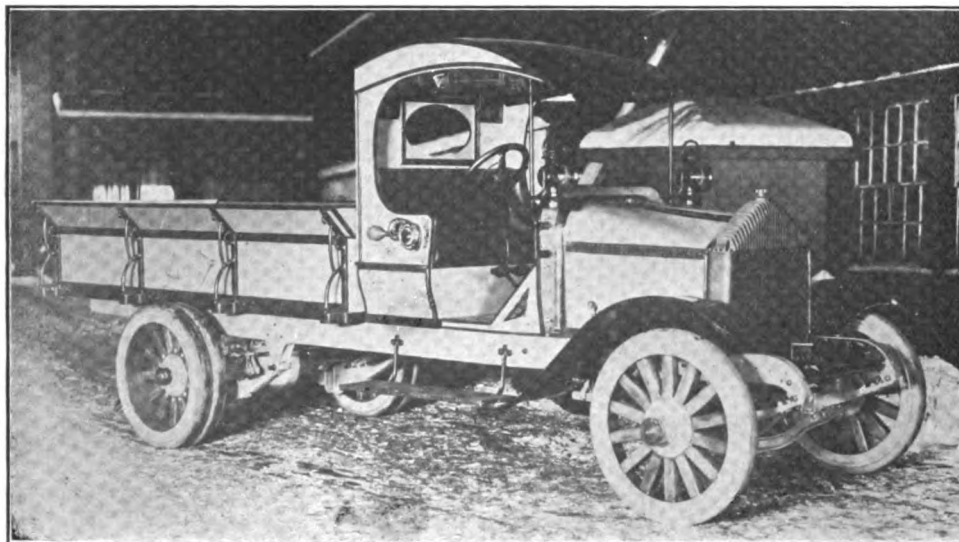
The motor used in each instance—reference now being had to the two new chassis models—

and reverse. The latter is assembled with the jackshaft, suspension being at three points to avoid the stresses of chassis frame distortion. Service brakes are expanding and the emergency members contracting on rear wheel drums. Springs are semi-elliptic, those at the rear being underslung. The front axle is an I section and the rear, rectangular. Wheels are 36 inches in diameter, carrying four-inch solid tires in front and three-inch dual members in the rear.

This chassis is produced in two lengths, 146 and 160 inches, although the former is standard, the latter being made only upon special order. The standard loading space is 109.5 inches length

and 48.5 inches width. The driver is located at the left and the control levers in the centre.

The three-ton chassis, that which is illustrated, has a motor with bore of 4.5 inches and stroke of 5.5, the cylinders being cast in pairs. The S. A. E. rating is 32.2, but the maker claims 40 horsepower under normal service conditions. The ignition system is the same as with the other, and the motor may be governed to



Model O Three-Ton Chase Truck, Equipped with Water-Cooled Motor and Worm Driven Rear Axle.

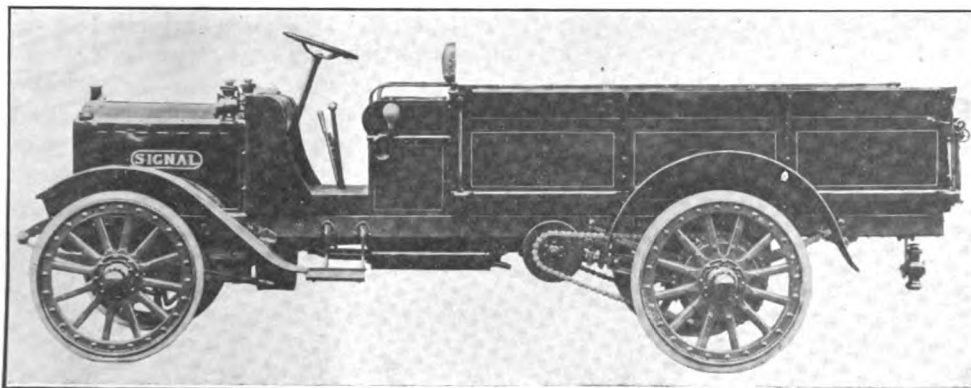
is a Continental four-cylinder, L head type. The smaller machine has an engine with bore of 4.125 inches and stroke of 5.125, the cylinders being cast en bloc. This motor has an S. A. E. rating of 27.2 horsepower, but is claimed by the maker to develop 30 practically under any condition of normal operation. Ignition is by a Bosch DU4 magneto with automatic spark advance. The engine is governed to a maximum speed of 1250 revolutions a minute, this being set and sealed at the factory so that it may not be changed without the knowledge of the owner.

The clutch is a multiple disc, and the selective transmission affords three forward speeds

any predetermined speed, by a sealed governor, in the same manner.

The clutch is a dry plate, and this and the four-speed selective transmission are assembled as a unit with the motor. Direct drive is on the third speed. From the gearbox the drive is through a propeller shaft, in which there are two universal joints, to a Selden rear axle, equipped with a worm and gear wheel of the David Brown type. This axle is designed to carry 80 per cent. of the load and is maintained to possess an ample margin of safety.

The frame is a channel section of pressed steel, having a width of 6.5 inches, depth of 5.5



New 1500-Pound Signal Delivery Wagon with Standard Express Body Equipment.

inches and thickness of .25 inch. This is well braced and has three cross members. The spring suspension and the braking system are the same as with the smaller vehicle. Wheels are 36 inches in diameter and carry four-inch tires, single in front and dual in the rear.

The wheelbase of this model is standard at 148 inches, but can be supplied at 165 inches. The standard chassis length is 218.5 inches, with loading space of 122.5 inches length and width of 52 inches. The driver is located at the left with central control lever.

SIGNAL DELIVERY WAGON.

Details of New Chassis of 1500 Pounds Capacity Recently Announced in Detroit.

Announcement is made by the Signal Motor Truck Company, Detroit, of a new 1500-pound delivery wagon chassis, which is held to be designed to meet the needs of those who desire equipment of this character. The machine is assembled by a factory organization that is regarded as highly efficient, and in the completed chassis are to be found the product of concerns well known throughout the industry in the manufacture of high grade components.

The motor is a Continental, four-cylinder, water-cooled, L head type, with bore of 3.75 inches and stroke of 5.25, the cylinders

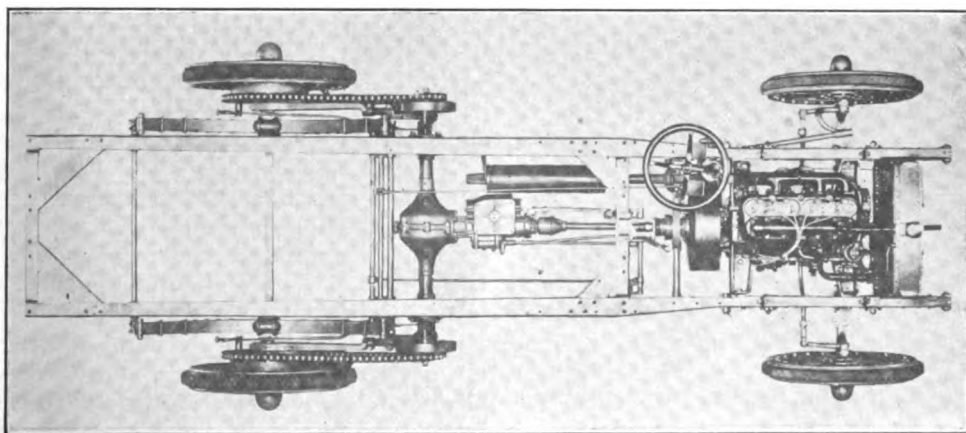
being cast en bloc. This has a rating of 22.5 horsepower under the S. A. E. formula, but the maker claims it will develop more than 30 under brake test. Ignition is by Eise-mann high-tension magneto, with fixed spark.

The clutch is a Hartford cone, and the selective trans-

mission is a Covert design, affording three forward speeds and reverse. The jackshaft is a Russell product. Drive to the rear axle is by chain. The front and rear axles are Timken construction, the former being an I section and the latter, rectangular. The frame is a pressed alloy steel channel section, and is mounted on special springs, made by the Detroit Steel Products Company and designed for truck service, which are fitted with a patented lubricating device. The service brake operates on the jackshaft, and the emergency, on rotating carriers on the rear axle.

Wheels are 34 inches in diameter forward and 36 inches rear. The forward tires are three inches in cross section, and those in the rear 3.125. The wheelbase is 115 inches and the tread 56 in front and 60 in the rear. With standard bodies the loading space is 96 inches length, 48 width, and the platform is 32 inches from the ground. The driver is located at the left, with central control.

M. E. McKenney of Milwaukee, Wis., has become assistant sales manager for the Federal Motor Truck Company, Detroit.



Plan View of Signal Wagon, a New Detroit Product Utilizing Standard Components.

HANDLING NITROGLYCERINE.

Five Adams Trucks Utilized by Oklahoma Concern in Hauling This Explosive.

One of the reasons assigned for the recent reductions in the price of gasoline was that several new oil wells had been opened in the Oklahoma district. The oil fields in that state cover a large area, much of which is represented by country that has been developed but little, and prospecting has been carried on at some distance from the towns and cities.

The drilling of wells necessitates hauling materials, etc., from the source of supply, and, in addition, as it often becomes desirable to use nitroglycerine in the wells to start the flow of oil,



Adams 3000-Pound Wagon Used for Distribution of Nitroglycerine in the Oil Fields of Oklahoma, Fitted with Special Equipment.

considerable quantities of this high explosive are carried about from place to place where work is in progress. To utilize horses for this service is costly, and dangerous when explosives are handled. For this reason those who distribute the nitroglycerine have adopted motor trucks, as being more thoroughly under the control of the driver, to say nothing of the longer mileage capacity.

The American Glycerin Company, with headquarters at Battersville, Okla., now has in use five Adams 3000-pound wagons, made by the Adams Bros. Company, Findlay, O., which have been built expressly for this work. The machines have 42-inch wheels, giving large clearance for use over rough roads, and where there are no

roads in the generally accepted use of the term. The driving chains are enclosed to prevent wear and avert danger. In other respects the chassis do not differ materially from standard.

The bodies are of the express type, but are fitted with special boxes having covers that may be locked. These are divided into compartments, each of which takes a single can. The rated capacity of the boxes is 720 quarts.

BUYING TRUCKS IN FLEETS.

Seven Concerns Purchase 21 White Machines, 17 Being with Dumping Bodies.

Strong evidence of the superiority of motor trucks in the hauling of supplies and materials in the building trade and in the handling of coal is found in the recent purchase of 21 White trucks, made by the White Company, Cleveland, O., by seven concerns in that city and three in New York City. This report follows closely that of nine similar machines sold to the Brooklyn Alcatraz Asphalt Company, Brooklyn, N. Y. Of the 21 mentioned above, 17 were fitted with the new power dumping mechanism, which is held to hoist and dump a load in 30 seconds.

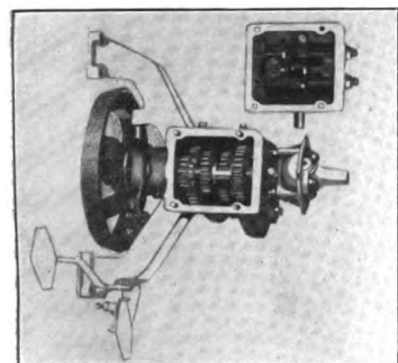
The Cleveland purchasers were: Brooks-Norton Motor Sales Company, which bought four five-ton machines to haul brick for the Farr Brick Company; Zettelmeyer Coal Company, one dumping truck; C. C. Parsons, two five-ton machines to haul material for the Euclid Brick & Supply Company; Cuyahoga Builders' Supply Company, one five-ton model; Cleveland Motor Truck Company, four five-ton dumpers for use for the Cleveland Macadam Company; Andrew Dall & Son, general contractor, five-ton platform dumping truck, and Lakewood Lumber Company, three-ton truck. In New York: Scranton & Lehigh Coal Company, four five-ton models; William Farrell & Son, two; Bacon Coal Co., one.

RESTORING THE TRANSMISSION ELEMENTS.

THE overhaul of the sliding gear transmission is a task the motorist should not undertake unless familiar with the work. With

either the selective or progressive types, a gear is moved on a shaft and made to engage with a corresponding member on another to obtain the various gear ratios.

A common source of trouble lies in the



Clutch and Transmission Removed from Chassis.

edges of the teeth becoming burred over, which makes it difficult to properly shift the members. Another cause is wear at the bearings, which changes the centre distance between the gears and so alters the pitch circle that they will not slide by each other. If the teeth are burred the rough edges may be restored to smoothness by grinding, but if the gears are badly worn because of worn bearings, it may be necessary to replace them with new. This will require the services of the expert and it is best to consult him when in doubt.

The cover to the gearcase should be displaced and as much as possible of the old lubricant removed before attempting to flush the case with gasoline or kerosene. By using an old brush the lubricant can generally be dissolved by the gasoline, and, after it is in a fluid state, remove the drain plug under the gearcase. Replace the plug and repeat the operation of cleaning until all lubricant and foreign elements are eliminated. If properly cleaned the inspection of the gears, bearings, shifting rods and forks will be simplified. One cannot be too careful in cleaning all corners and crevices of the gearcase, as minute particles of metal sheared off the edges of the gears may be present.

The gears should be tested to determine that they are firmly attached to the shafts with which

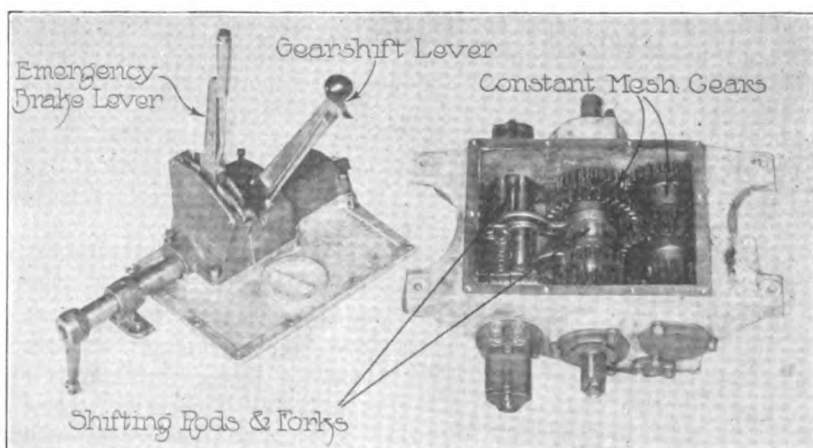
they rotate, and that the bolts, keys or pins by which they are fastened are securely in place. Looseness of these members not only causes noisy operation, but may result in shearing off the parts due to the constant hammering action.

The shifting yokes and collars will require attention, and, if any play exists, the defective parts should be replaced, which should fit with the minimum of lost motion. The locking device, commonly employed to prevent motion of the members when not in use, should be examined and tested to see if it performs its function properly.

Relative to bearings: Those of the ball type will require careful examination and cleaning. Metallic particles between the balls or races will cause a rapid destruction of the parts and one cannot be too careful in the work, or in the selection of the lubricant employed.

Many amateur workmen make the error of passing bearings as being satisfactory when there is a little play, but it should be borne in mind that lost motion contributes to trouble in time. All collars and levers on the shifting members should fit properly and have no back lash or play, as they are intended to engage with a limited sliding movement.

The different gears should be engaged and, with the gearcase and gearset clean, it will be an easy matter to determine if the gears mesh properly. A partial engagement with the lever in its locked position will not be satisfactory, as only a portion of the teeth of the gear will take the driving stresses. Means are generally provided for adjusting the forks and rod members. Renew felt washers if this is found necessary.



Selective Type of Transmission and Control Levers—Inspect Bearings, Shifting Forks and Rods for Lost Motion and Examine Gears.

CAUSES OF FAULTY CLUTCH ACTION.

IN OVERHAULING a car, even if the clutch has not given trouble, it will be well to carefully examine the components to detect wear that may cause trouble at some time, and which can best be prevented by proper restoration.

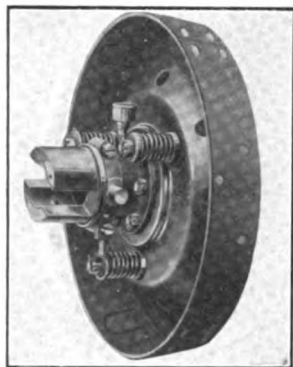


Fig. 1—Cone Clutch.

Dealing first with the cone clutch: The parts most subject to wear are the leather facing and at the bearing surface of the male member where it revolves on the shaft. The leather may have become hard, or charred because slipping has caused the facing to heat. The spring that holds the parts in engagement may have become weakened, and the cone hub so worn that its bearing surface will cause the clutch to drag, making the changing of gears difficult and noisy.

Types of cone clutches are presented at Figs. 1 and 4, the latter design being lettered for identification. Both clutches are adjusted by nuts, screwing in of which increases the tension of the springs. Care must be taken not to turn one nut more than another.

If the clutch be suspected of dragging it may be tested by removing the floor boards and, with the motor operating, depressing the clutch pedal fully. If the clutch continues to spin, note if its lower section is in contact with the flywheel. This will indicate worn bearings, which will require the attention of the expert. Sometimes the clutch design is such that spinning cannot be avoided without a clutch stop, and if one has not been provided to overcome the trouble, it is possible for the owner to fit one. It should be so adjusted that it retards the rotation of the clutch, but does not wholly stop it.

If treatment of the leather with neatsfoot oil, kerosene, fuller's earth, etc., does not remedy the trouble, and it is necessary to fit a new facing, the diagram at Fig. 3 will be of service in laying out the lining, provided the old member cannot be utilized. Take a large sheet of paper and lay out the clutch to exact size, being sure that the faces are at the proper angle. Draw a line through the centre of the hub and parallel with it, this being represented by the line A-B. Continue the angle of the cone by straight lines meeting at a point on the centre line. Then, using

this point as a centre and the distance from B to C and B to D as radii, describe the circles E G and F H. The distance from E to G must equal the largest circumference of the cone, so that the ends will butt together; or it may be advisable to make the strip a little longer than necessary and allow for fitting. The pattern thus obtained may be used to cut the new leather.

Before riveting in place the leather should be made as pliable as possible with oil, and if properly fitted there will be no danger of the leather becoming too loose or so closely engaged about the cone that it will tear from its fastenings. In fitting, clamp it to the cone, drill the holes and make sure that they are well counter-sunk. Rivet one end and then pull the leather tightly around the cone to the next point of fastening, the facing being stretched by a clamp; the holes drilled and the rivets applied, this operation being repeated from one point of attachment on the outer circumference of the cone to the next one.

After the facing is applied, the cone should be trued in a lathe by taking a light cut off the surface, or the high spots may be rubbed off by hand with sandpaper, a piece of glass or a coarse file. The best material for cone facing is good oak bark tanned sole leather or belting.

The multiple disc type of clutch is popular with modern car makers and these may be divided into two general types, those operating in lubricant and dry. The first named generally comprises plates of steel and other metals, such as

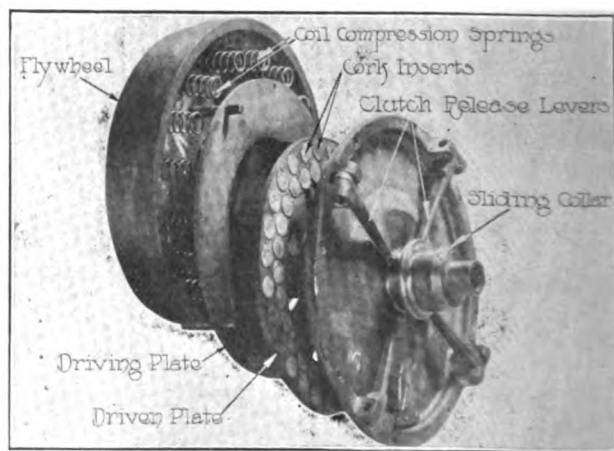


Fig. 2—Form of Clutch Utilizing Cork Inserts to Minimise Harsh Engagement.

steel to bronze, etc. While the modern design rarely gives trouble if properly lubricated and adjusted, earlier forms may annoy the driver by

slipping, generally due to distortion of the plates, or weakening of the spring maintaining contact between them. Too harsh engagement is caused

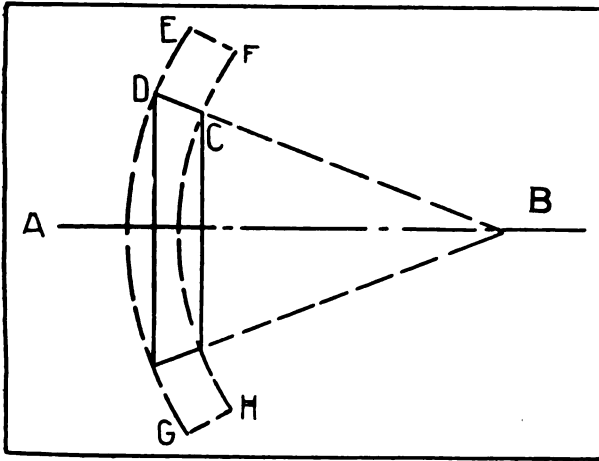


Fig. 3—Pattern for Laying Out New Lining for Cone Clutch Employing Leather as Friction Material.

by absence of lubricant, presence of carbon or roughness of the surfaces. Spinning, primarily the cause of difficult meshing of the change speed gears, is often due to seizing between the plates, gummed lubricant, etc.

In the opinion of the writer the disassembly of the multiple disc type of clutch and its repair are best left to the expert unless one is thoroughly familiar with the work. The construction is too expensive to replace in the event of damage by incompetent workmen.

Practically every maker gives complete instructions for the care of the multiple disc clutch and states specifically the best grade of lubricant to employ. If the clutch has not been operating satisfactorily, remove the old lubricant and fill the case with kerosene. Next disengage and engage the clutch several times, and spin the motor with the gearshift lever in neutral. This will work the kerosene in between the plates, cleansing them. Remove the fluid and refill with fresh lubricant. It is possible that slight adjustments will be necessary, and if these fail to cure slipping or harsh engagement, it is best to consult a repairman who is familiar with the clutch utilized.

At Fig. 2 is shown a type of dry plate clutch employing cork inserts in the middle member. These are utilized to eliminate harsh engagement, as well as to increase the power transmitting qualities without increasing the dimensions of the construction. These cork inserts if worn flush with the surface of the plate, or, in other words, if they fail to make contact with the driving and driven plates, should be replaced

with new material free from cracks, etc.

The surface or face of the corks should extend but slightly beyond that of the face of the plate, and with some types of clutches .0025 inch is the maximum. It should be remembered in fitting the inserts that they are utilized only to provide easy engagement and that the drive is taken by the plates, not the corks. If the inserts are too thick, it may be difficult to adjust the toggles so that the clutch will hold, and trouble will be experienced in fully disengaging the clutch. With the majority of designs the corks may be fitted without dismantling the clutch.

In adjusting clutches of this type, the adjusting screw bolts should be turned the same number of rotations to insure an even pressure of the plate transmitting the drive to the clutch shaft.

Faulty clutch action may be due to a number of conditions existing outside of the clutch, such as wear at various points of the operating mechanism and defective adjustment of the linkage. As the type of control varies with every car it is not possible to give other than general instructions for adjustment. Many cases of failure of the clutch to release have been traced to poor adjustment of the interlocking levers and rods; for instance, a worn shifting collar often hinders disengagement, as the clutch pedal may be fully depressed without materially reducing the pressure of the spring that maintains the parts in contact.

Small pins are sometimes worn to half their diameter, and the holes which they are designed to fit are worn oval, considerable play being evident. If this exists at several points it may amount to considerable and the lost motion will not only cause rattle, but make it impossible to

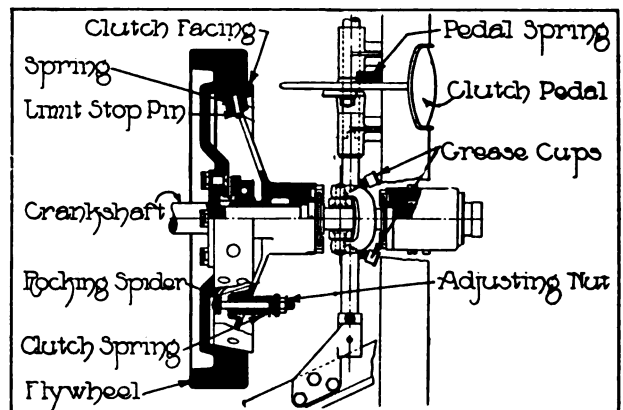


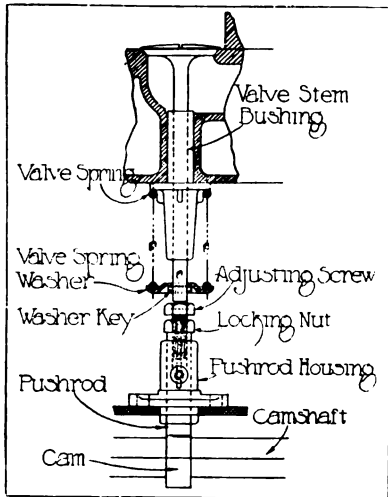
Fig. 4—Components of Conventional Type of Leather Faced Cone Clutch and Operating Linkage.

properly disengage the clutch.

Before attempting to make any adjustments to the linkage, its operation should be studied.

ADJUSTING AND TIMING THE VALVES.

THE amount of work necessary to place the valves and their mechanism in condition will depend upon the age of the car and the time



Components Utilized in Adjusting Valve Lift.

that has elapsed since the last overhaul. The valves of the practically new machine may not require other than grinding and a checking up of the timing. For this work some form of valve lifter and abrasive will be necessary. The use of a valve grinding tool or a screw driver is optional. A number of the former are marketed, as are valve lifters, and in selecting the tool it is well to consider its adaptability to the motor. Valve grinding compound can be purchased or made. The writer obtains excellent results with the finest grade of carborundum mixed with oil, but as it is a rapid cutting abrasive it is best to employ plenty of oil with it, if not familiar with its use.

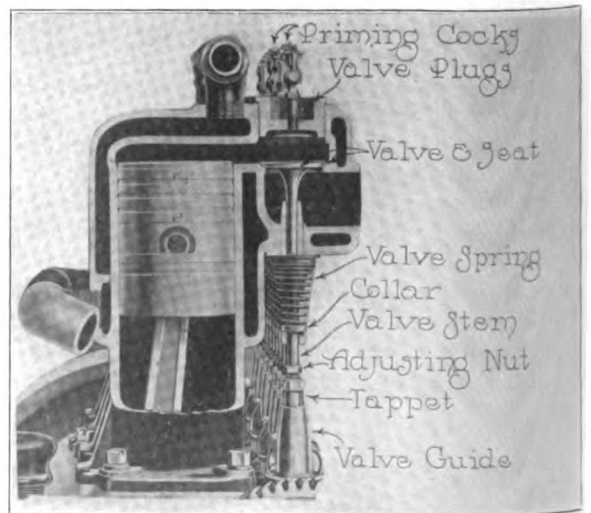
The first step is to take out the valve plugs, and if these be rusted in it may be necessary to heat the members, as when displacing frozen nuts. This can be avoided in the future by graphiting the threads of the plugs. Before attempting to remove the valves the valve springs must be compressed and the pin or key retaining the washer or collar taken out. Generally, the valve lifter holds the valve on its seat while the spring is being compressed. In performing this work make sure that the valve is seated. Unless the valves are numbered it is best not to remove more than one at a time when cleaning and grinding.

Examine both the stem and the head of the valve for wear or defects. The cylinder seat should be perfectly smooth and free from grooves or deposits and the bevel seat of the valve head should be in the same condition. After scraping off the carbon deposits it may be noted that the seats, especially the exhaust members, are pitted. Before grinding, examine the valve

stem, as it may have a shoulder, caused by an uneven pressure of the spring forcing it against the valve stem guide. Warped or bent stems should be straightened.

Before grinding, be sure that the valve tappet is at its lowest position so the valve will seat. Smear the seat of the valve head with the abrasive, insert in the cylinder, and with the screw driver or valve tool, impart a reciprocating movement to the valve. Exert only a light pressure and from time to time lift the valve to prevent the abrasive from scoring the seat. Take out the valve, wipe it and its seat clean and inspect it. The grinding process should be continued until the seat is perfect. It may be that the valves and their seats will need reseating and this will require a special tool and experience. Grinding valves necessitates care and the results obtained should be passed upon by an expert if the work is performed by the novice.

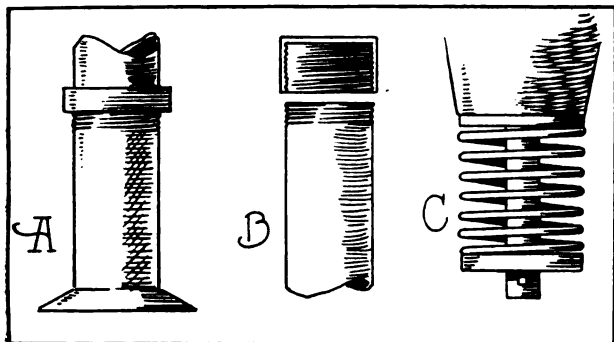
A common cause of missing at low motor speeds is weak valve springs or air leaking past the valve stems and their guides. This trouble is rarely experienced in new motors, being more prevalent in old types. If the guides are bushed, new bushings can be fitted; if not, a stuffing box, such as shown in an accompanying illustration, may be made. It is constructed of brass tubing, threaded as indicated at B and screwed onto the guide, which will also have to be provided with



Section of Cylinder Cut Away to Illustrate Valve Mechanism Assembly.

threads. A bevel seat is cut in the guide to retain a strand or more of graphited candle wicking which fills the space between the stem and

the guide. Another plan is shown at C. It consists of making a leather washer and cutting the hole for the valve stem slightly smaller than the



Preventing Leakage Around Valve Tappets: A and B, Stuffing Box of Brass Tubing; C Utilizing Leather Washer.

diameter of the stem. The washer is held in place by the valve spring.

Before assembling the valve mechanism, the valves and the cylinder seats must be washed thoroughly with gasoline to prevent any of the abrasive being carried into the combustion chamber. Some pack the port with waste, but this is not necessary if care be exercised in the washing.

Coming next to the valve operating mechanism: If the tappets are removable without displacing the crankcase and camshaft, it is a good plan to inspect them for wear. New motors will not require this attention. If roller types of pushrods are employed, clean and examine the pins retaining the rollers, as they may be so worn as to create lost motion and cause a late opening of the valves, besides noisy operation. New pins are not expensive and any machine shop should be able to make the necessary repairs.

The tappet or pushrod bushings may be so badly worn that considerable lubricant is forced out by the crankcase compression. While this defect is not serious, considerable oil is lost, to say nothing of the lubricant attracting road dust. With some types of motors it will be necessary to remove the camshaft to take out the bushings and fit new ones. Care must be taken in driving them out, as it is an easy matter to break the crankcase.

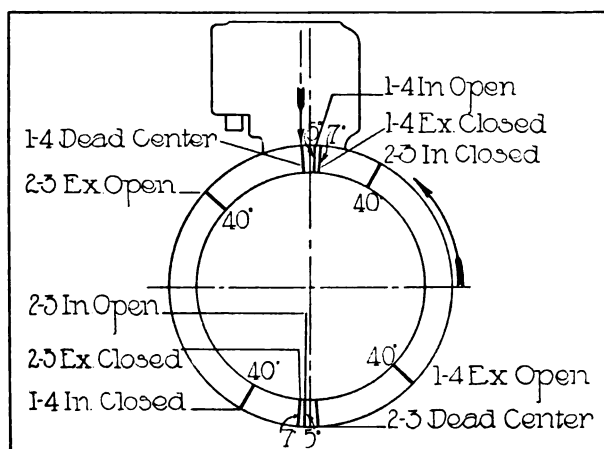
As the general practise is to fit adjustable tappets, it is a simple matter to check up or correct any error in the timing of the valves. Before attempting the work examine the top of the hardened nut, as this member may be hollowed out where it comes in contact with the end of the valve stem. If such be the case, it should be ground smooth and true.

The practise of adjusting the clearance between the valve stem and the tappet by a business card, etc., is not recommended if accurate timing is desired. When it is considered that the efficiency of the motor depends upon the proper opening, lift and closing of the valves, it will be seen that the work of adjusting the tappets is not best performed by guess work.

It is the exception rather than the rule, that the flywheel of the motor is not marked with the opening and closing points, also the dead centres. These markings also serve to facilitate the setting of the magneto or other ignition system. The points described are indicated by figures and letters. For example: I O 1-4, denotes the opening points of the intake valve of the first or fourth cylinder and I C 1-4, their closing points. Similarly E O and E C denote the opening and closing points respectively of the exhaust members.

The method of utilization of these points is simple. Rotate the flywheel in its normal direction until the mark I O 1-4 comes opposite the arrow or other point on the upper crankcase or cylinder. With the marks registering, the inlet of the first or fourth cylinder should begin to lift. If not, the adjusting nut of the tappet is loosened and the nut member lengthened until the valve stem begins to raise. Lock the nut and rotate the flywheel a half turn until the next valve in the firing sequence lifts. After resetting each, check the openings and closing points a second time to make sure the timing is correct.

A feature of the automobile show held in Lexington, Ky., recently, were the daily runs of the Lexington fire department's motor appa-



Illustrating Use of Flywheel Markings in Timing Opening and Closing Points of the Valves.

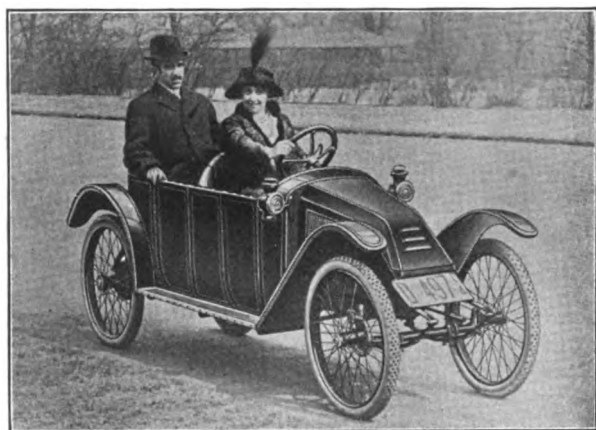
ratus, which were held between the hours of 3 and 4 in the afternoon, with demonstrations of the working of the new aerial ladder truck.

WITH THE CYCLECAR MANUFACTURERS.

New Jersey Club Plans First Competitive Events for Memorial Day---O-We-Go and Hawkins Among America's New Models---Initial Machine from Canada.

MEMORIAL Day promises to witness the initial appearance of the American cyclecar in competitive events. Numerous sociability runs are set for that date by various cyclecar clubs throughout the country, but to the Cyclecar Club of New Jersey belongs the honor of announcing the first race meet. This will be held at Dr. Charles G. Percival's farm in Teaneck, at the conclusion of the cross country run from Newark. Dr. Percival is president of the club.

Practically all of the cyclecar clubs and some 38 manufacturers of cyclecars have protested against the control of contests in this field by the American Automobile Association, the sentiment being entirely in favor of leaving such matters to the Cyclecar Manufacturers' National



Latest Model of Woods Mobilette, in Jackson Park, Chicago.

Association. The president of the latter body, W. H. McIntyre, of the Imp Cyclecar Company, Auburn, Ind., has presented a trophy to the Cyclecar Club of New Jersey, which will be awarded to the member winning the greatest number of points in the following six events: Speed-up race, standing start; slow race, low gear; starting race, with motors cold; reverse gear race, 45 yards up-grade; hill climb, 1000 yards, grade of 7:1, and a pint-of-fuel race over a measured course.

Cyclecars also will be prominent among the visiting machines at the international sweepstake 500-mile race on the Indianapolis motor speedway, Memorial Day. Members of the Chicago and Detroit clubs will journey overland to South

Bend, Ind., forming a joint tour from that point into Indianapolis, where they will be the guests of the Hoosier Cyclecar Club.

LATEST WOODS MOBILETTE.

Constructional Details of Second Model Designed by Francis A. Woods.

After experimenting for some 18 months with the original model of the Woods Mobilette, the designer, Francis A. Woods, has made several changes in the construction of the machine bearing his name, chief among these being the substitution of a four-cylinder motor for the two-cylinder unit at first employed. This model No. 2 is being produced at present at 1509 Michigan boulevard, Chicago, by the Woods Mobilette Company. An accompanying illustration shows one of the vehicles in Jackson park, in that city.

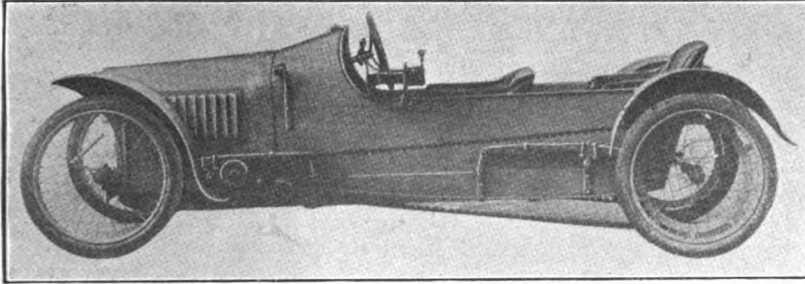
Despite its four-cylinder motor, the machine is still a true cyclecar, within the definition of the Cyclecar Manufacturers' National Association. It seats its two passengers tandem, and has wheel-base of 98 inches and tread of 30—the smallest tread of any American cyclecar. The motor has bore of 2.68 inches and stroke of 2.93. Cooling is by air.

The transmission is incorporated with the rear axle. The latter is of the full floating type with full bevel gear differential. The gearset is of the planetary type, affording two forward speeds and reverse. The shifting lever is in the centre of the car, and the selective type quadrant is used. The multiple disc clutch is located in the transmission case. The drive shaft runs in a straight line from the rear axle to the crankshaft, where one universal joint is employed. Springs are semi-elliptic in front and cantilever in the rear. Wheels are of wire, carrying 28 by 2.5-inch tires.

O-WE-GO FROM OWEGO.

Prominent Men Identified with Former Hatfield Truck Manager in This Venture.

Designed under the direction of Charles P. Hatfield, Jr., formerly general manager of the Hatfield Auto Truck Company, Elmira, N. Y.,



O-We-Go Closely Follows Standard Streamline Design for Tandem Machines.

the O-We-Go has made its appearance, and will be manufactured at Owego, N. Y. The concern is styled the O-We-Go Car Company, capitalized for \$150,000, with offices and headquarters at 286 Fifth avenue, New York City. The machine is a tandem seater, with wheelbase of 104 inches, tread of 36, clearance of nine and weight of 600 pounds.

The president of the company is George Ramsey, a prominent New York bank director, also associated with the Riker-Hegeman Drug Company. The vice president is W. I. Payne, who is connected with a number of important New York concerns, including the Standard Oil Company. George R. Ramsey is treasurer and Mr. Hatfield secretary and general manager.

The motor is a two-cylinder, air-cooled V type, rated at 10-12 horsepower. The dimensions are not given. Ignition is by the Atwater Kent Unisparker system, and the carburetor is a float feed type. Lubrication is by force feed.

The friction transmission is of special design, and affords five forward speeds and reverse. The friction plate is supported on a frame entirely separate from the motor, and thrust is taken by means of an extra large ball bearing. The friction wheel runs on a shaft at right angles to the flywheel, and is faced with fibre filler, said to have been molded under a pressure of 50 tons to the inch.

Drive to the rear wheels is by double 1.125-inch V belts. Springs are cantilever, front and rear. The wheels are of extra heavy wire, fitted with 28 by 2.5-inch tires. Brakes are expanding in rear wheel drums. Steering is by 15-inch hand wheel with worm and gear. Control is by spark, throttle and speed shift lever on the steering column and foot accelerator.

Aside from the passenger body, which is of steel and streamline in design, the chassis also is fitted with a light delivery

van with open box or full panel with top. The equipment consists of electric lights, windshield, horn and tools.

It is stated that Mr. Hatfield has been testing the initial machine over all kinds of roads and under all weather conditions in New York State during the past three months, and is thoroughly convinced of its practicability. In

fact, it is maintained that there has been no occasion for changing any of the details of construction, and future models will follow the original drawings.

DETAILS OF THE ZIP.

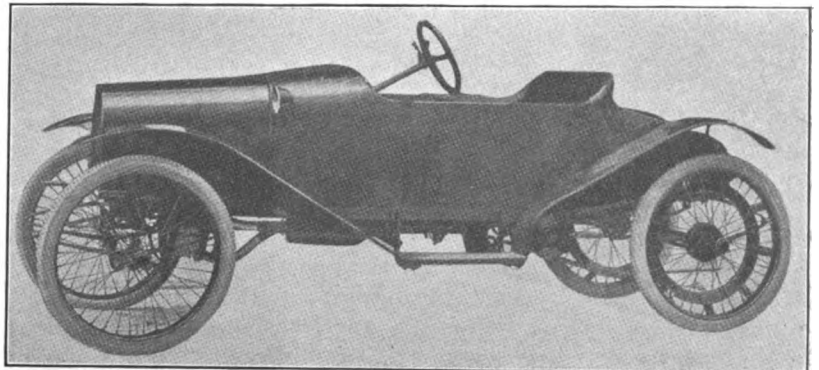
A Cyclecar That Has Already Gained a Reputation for Long Distance Touring.

One of the makers which, according to the best information available, is ready to ship cars in quantities, is the Zip Cyclecar Company, Davenport, Ia. Zip machines have been undergoing severe road tests throughout the winter, and several long distance trips have been taken. The maker is convinced that its practicability has been thoroughly demonstrated, and that the present design will not need change.

The Zip is a true cyclecar, with side-by-side seating, the driver being located at the left. Special attention is directed to the amount of space between the dash and the back of the seat, 52 inches, which is held to give ample leg room. The wheelbase is 92 inches and the tread 40.

The motor is a two-cylinder, air-cooled V type, with bore of 3.375 inches and stroke of 3.9. Ignition is by Atwater Kent Unisparker, and carburetion by a Schebler. Lubrication is by combined force feed and splash, automatically controlled under all speeds by a four-speed oiler.

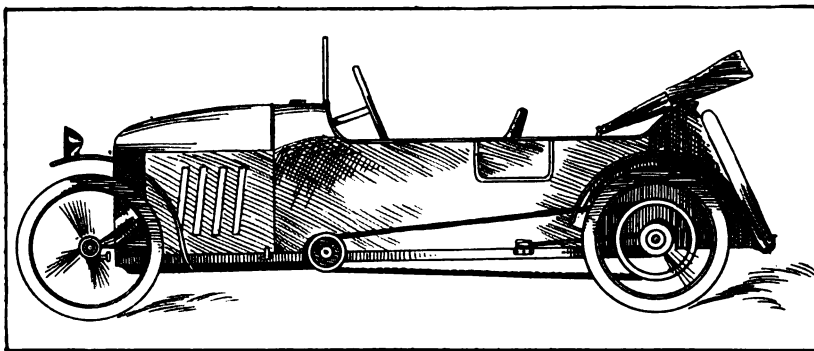
The transmission is of the friction type, af-



The Zip, a Well Known Product, Seats Its Passengers Side by Side.

foring any number of speeds forward and reverse. The friction disc is 12 inches in diameter, of special gray iron and mounted on New Departure ball bearings. The friction wheel, or spur wheel as it is termed, is of the same diameter and is provided with a hard fibre filler face 1.25 inches depth. This is mounted on a steel shaft, also utilizing New Departure bearings. The pulley wheels on the end of the jackshaft are adjustable to different gear ratios, ranging from 3:1 to 6:1, and drive to the rear wheels is by 1.125-inch duck wall, non-stretchable belt.

Springs are full elliptic, front and rear. Expanding brakes operate on inside drums on the rear wheels, and the bands are six inches diameter with 1.125-inch face. Both axles are I beam section drop forgings, equipped with grease cups at all bearing points. Wheels are of wire, carrying 28 by 2.5-inch tires. The equipment includes a six-volt, 40 ampere-hour battery, spe-



The Hawkins Has Made Its Initial Appearance from Factory in Xenia O.

cial electric headlights and tail lamps, electric horn under the hood, etc.

FIRST CANADIAN CYCLECAR.

The Wel Doer Makes Its Initial Appearance from Factory in Berlin, Ont.

While it has been stated from time to time that a number of cyclecar concerns were soon to make their appearance in Canada, the first actually to make announcement of a completed vehicle is the Welker-Doerr Company, Berlin, Ont. The machine is a true cyclecar, termed the Wel Doer, and seats its two passengers side by side, with the driver at the right. The wheelbase is 100 inches, the tread 36 inches and the weight 500 pounds.

The motor is a two-cylinder, air-cooled unit, rated at 9-13 horsepower. Ignition is by Berling dual magneto. Transmission is by friction, with final drive by belt. The frame is of reinforced white ash, suspended on quarter-elliptic springs.

Wheels are of wire, fitted with 28 by three-inch tires. The body is of metal, streamline in design, and the equipment includes a single Prest-O-Lite headlight, oil tail lamp, etc. It is stated that a top and windshield also will be fitted, although these do not appear on the original model.

NO STOCK FOR SALE.

Hawkins Cyclecar Company of Xenia, O., Makes Its Initial Announcement.

After undergoing road tests during the past year, the Hawkins cyclecar is being announced by the Hawkins Cyclecar Company, Xenia, O. The concern is capitalized for \$50,000, and it is expressly stated in the announcement that there is no stock for sale. The officers are: President, Hon. George Little; vice president, John W. Prugh; secretary, A. V. Perrill; treasurer, C. H.

Little; engineer and general manager, P. E. Hawkins.

The machine is a true cyclecar, with two passengers seated tandem. The wheelbase is 100 inches and the tread 36. The weight is not stated. The motor is a two-cylinder De Luxe, rated at 9-13 horsepower. Ignition is by Atwater Kent Unisparker, and the carburetor is a Schebler.

Drive is by chain from the motor to the planetary transmission, affording two speeds forward and reverse, mounted on Hyatt roller bearings. Final drive is by 1.125-inch V belts. Springs are cantilever, front and rear. Wheels are of wire, carrying 28 by 2.75-inch tires. Control is by spark and throttle lever on the steering wheel. Standard equipment includes head and tail lights, with Prest-O-Lite tank.

It is expected that demonstrating cars will be placed in the hands of dealers at once.

The motorists of the Chicago Athletic Association and the Chicago Automobile Club, will hold their seventh reliability run June 12-13. The route will be to Peoria and return, and it is planned to cover a distance of 165 miles each day. In the six previous dual tours the C. A. A. men have won five.

Detroit's total production for motor vehicles of all classes for February was 36,890, of which 35,900 were passenger cars.

CLEANING AND LUBRICATING SPRINGS.

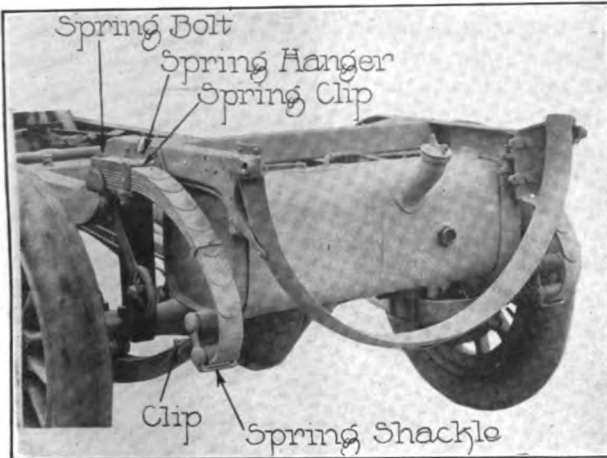
THE average motorist, in undertaking the overhaul of the car, generally slightes the springs, especially the cleaning process, and is

They will permit of carrying the spring to the work bench and noting if play exists in the shackles, due to insufficient lubrication or a badly worn bolt.

To disassemble a spring, clamp it in the vise, and unscrew nut of the bolt passing through the centre of the leaves. Open the vise gradually, until the leaves assume their normal shape. They can then be handled easily, and all rust should be removed with emery cloth or an abrasive. After cleaning, prepare a mixture of oil and powdered graphite, smearing the preparation liberally over the bearing surfaces of the leaves. The surplus material is then removed and a little powdered graphite sprinkled on the surfaces during the assembly, which is performed by the aid of the vise. Make sure that the nut of the retaining bolt is set up snugly.

If the shackle bolts are badly worn, it will be necessary to fit new members, and if the shackles are bushed, new bushings will be required, as a new bolt may not eliminate the lost motion. If the parts are in good condition, displace the bolts and make sure that the passages conveying the grease to the bearing surfaces are free. If new bolts are required, it is a good plan to purchase those having a grease cup attached and with grease ways, as they are not expensive.

Irrespective of whether the springs are disassembled or not, all spring clips, shackles, hangers, etc., should be gone over carefully and loose components tightened. Many times the breaking of a leaf is due to a loose clip, and it will generally be noted that the rupture occurs between the clips. Spring pads need inspection.

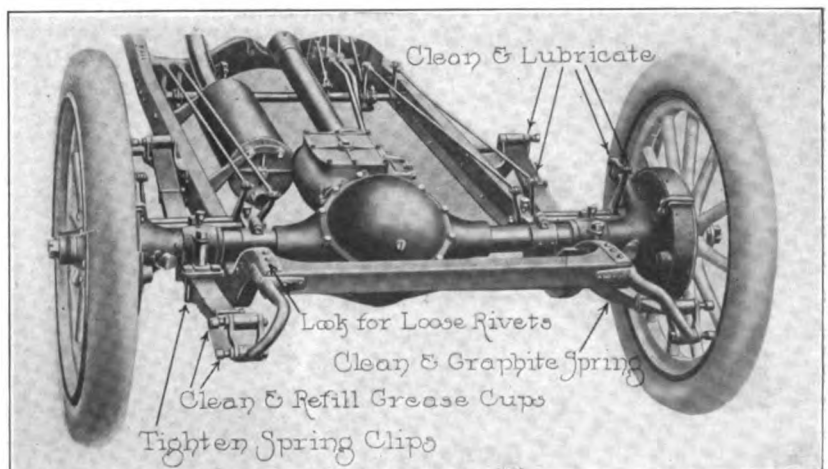


Conventional Type of Rear Springs and Components Requiring Attention in the Overhaul.

usually content with refilling the grease cups with lubricant. The spring suspension of the machine is deserving of the same careful attention as other components of the chassis, for not only is the comfort of the passengers involved, but there is the possibility of a spring breaking when it is least expected. With some cars the drive is taken through the springs, which makes it necessary that the worn components be replaced if it is not possible to eliminate the lost motion by ordinary methods.

The writer advocates the entire disassembly of the springs when they have not been cleaned and lubricated for some time. This work, however, may be performed by the motorist without removing them from the car, as there are several types of spring spreaders on the market which permit of separating the leaves sufficiently to clean and lubricate. The method is optional with the motorist.

To displace the springs the chassis will have to be so jacked up that all weight is supported by the frame. The method of removing the springs will vary according to their design, and if three-quarter elliptic for example, it will be a simple matter, as they are retained by spring clips.



Springs Should Be Cleaned and Graphited and All Clips, Nuts and Bolts Tightened.

CLEANING AND ADJUSTING BEARINGS.

THE motorist should have at least a working knowledge of how to clean and adjust ball and roller bearings, for these members will require periodic attention. It should be remembered that the cost of either type is such as not to warrant their neglect.

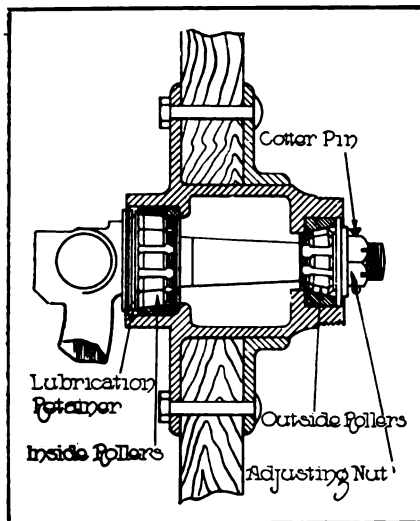


Fig. 1—Type of Roller Bearing.

bearing a maximum freedom of .001 inch. In connection with this, in single radial bearings an axial freedom or end play of the inner race relative to the outer is allowed, this varying with the size of the bearing between the extremes of .0005 to .005 inch for new bearings. If there is an excessive amount of radial or axial motion, it is invariably caused by the admittance of some abrasive between the parts. The amount of wear will depend upon the cutting power of the abrasive and the length of time the foreign matter is between the surfaces.

Many bearing troubles have been traced to the presence of dirt and metallic particles, and often rust is created by the application of water to the parts in which the bearings are mounted. Rust is particularly destructive to ball bearings and its results are noted by pits or depressions. They may also be caused by the presence of acid in the lubricant.

Bearings should not be washed in dirty gasoline. A simple solution of common washing soda and hot water is easily made by using about a handful of soda to a pailful of boiling water. The bearings should be dipped in the fluid to remove all dirt, then immersed in clean kerosene and thoroughly washed. It will take but a few minutes to accomplish both operations, after which the bearings should be inspected.

Many anti-friction bearings are damaged in the removal or application. A common cause of

failure is noted when they are driven in place by blows from an ordinary machinist's hammer applied directly to the bearing face or through the medium of a steel drift or blunt cold chisel. Ball bearings should never be driven in place or removed by the use of steel or hard metal tools because the race members may be permanently sprung or deformed by the treatment.

A wheel puller having two arms and a cross beam should be used when removing a bearing cone. An attachment to permit it to remove a bearing of the unit type, such as a double-row annular, without exerting any pressure on the balls or outer race is depicted at Fig. 2. This consists of a split casting adapted to be clamped loosely around the shaft back of the bearing inner race, and any pressure exerted to remove the bearing is applied directly against the member which is a force fit on the shaft. When any form of hub or bearing puller fails to start the member to which it is applied by direct pull, its action may be accelerated after the screw has been tightened sufficiently to place the parts under a certain initial tension by a few sharp, well directed hammer blows on the beam or main body of the device.

In all cases, where possible, the pressure applied to remove a bearing or part should be exerted directly against the portion that is a tight fit on the shaft or in the housing. In most cases it is the inner member of the bearing that is a force or press fit on the shaft; the outer member is usually a push fit in the housing and may be removed easily.

If it is necessary to force the bearing off with a series of blows, always use a brass or hard babbitt metal bar or drift, or even a piece of hard maple, hemlock or oak. Do not direct all of the

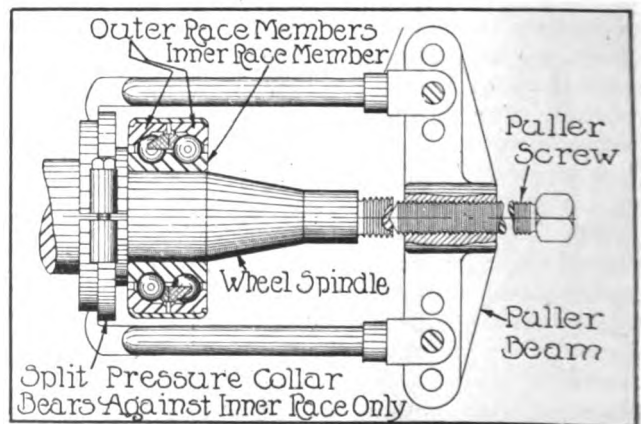


Fig. 2—Construction for Removing Single or Double-Row Annular Bearings Without Exerting Stresses on the Balls.

blows at one point on the bearing as this tends to cramp it and will make it harder to drive off. Distribute them evenly around the entire circumference, always having successive blows at points diametrically opposite. When driving bearings in place, it is always best to use some form of soft metal yoke member or a tubular section piece as indicated at Fig. 4. With either the hammer blows should be distributed evenly.

In adjusting the cup and cone type of bearing, care should be taken not to have it too snug or too loose. The condition of the bearing may be ascertained by jacking up the wheel, then grasping the wheel rim at opposite points and shaking the wheel. Any looseness in the bearings can be detected by lost motion between the wheel hub and spindle, but play in the spindle or its bolt should not be confounded with that in the bearings.

In taking up lost motion considerable judgment must be

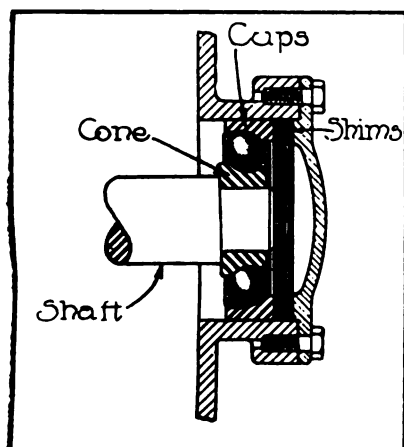


Fig. 3—Shimming Ball Bearings.

exercised in screwing up on the adjusting member, not to get this too tight and impose an injurious end pressure on the balls. An excess pressure that will stress the bearing parts dangerously will not make much difference in wheel resistance when turned by hand, although, when the car weight must be sustained at high speeds or when going around corners, the resistance will be increased materially and bearing endurance reduced in proportion. A safe rule to follow is to take up the wear by screwing in the adjustment nut so that the shake or looseness will be eliminated, yet permit the wheel to spin a few revolutions when given an initial impulse. Many motorists make the mistake of adjusting bearings of the take-up type too loosely. This is not desirable any more than the fitting of parts too loosely together. Always lock the adjustment nut securely.

Some bearings are shim adjusted, a number of thin washers of sheet brass being interposed between the bearing cup and retainer as shown at Fig. 3. When taking down an assembly of this nature always keep the shims from any bear-

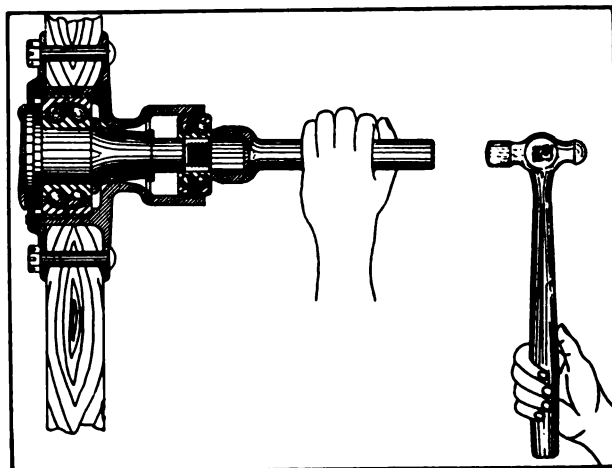


Fig. 4—Showing How the Blows of a Hammer May Be Distributed Evenly with Tubular Tool.

ing together and tagged for future identification to insure that the adjustment made at the factory will be maintained in the reassembly. If the bearings are loose for any reason, add thin shims about .005 inch thick to the others until there is no apparent lost motion and yet no binding between bearing parts.

A good lubricant for bearings is slush made of pure vaseline and lighter mineral oil, this being heated to make its viscosity less and enable it to penetrate to all parts of the bearing. When the bearings have been dipped in this and allowed to remain long enough to permit the oil to reach all parts, they are taken out and allowed to cool, and the surplus lubricant wiped off the outside. Such a mixture will stay in place and will not run out like lighter oils.

The same care and attention should be given roller bearings and the suggestions for adjusting the ball types may be utilized. Care must be taken, however, not to set the rollers up too snugly. With either ball or roller types, if a ball or roller is worn, it is best to renew all.

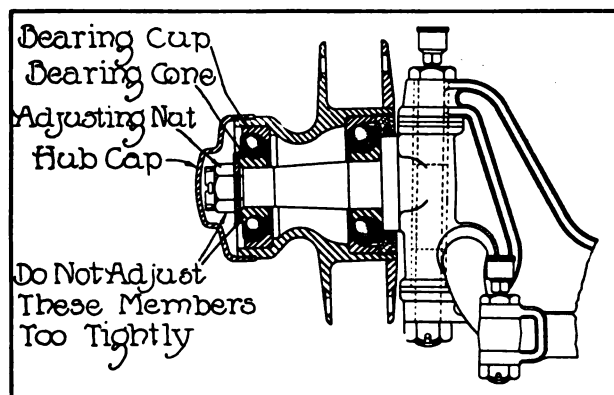
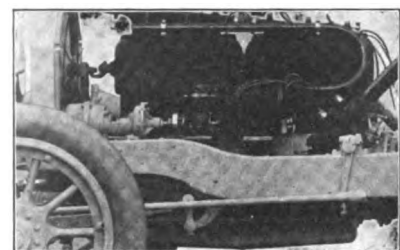


Fig. 5—Components of Ball Bearings Used in Adjusting, and Parts Requiring Care in the Work.

OVERHAULING STEERING GEAR AND LINKAGE.

TOO much emphasis cannot be laid upon the importance of thoroughly overhauling the steering gear and its linkage and the work of restoring or adjusting worn parts must be carefully performed. The steering gear mechanism is subjected to continuous operation when in service and no expense should be spared to place it in the very best possible condition.



Play in the Drag Link Is Not Desirable.

While a slight amount of play in the wheel is permissible, undue lost motion is undesirable and should be eliminated, for it not only makes for difficult steering, but prevents perfect control of the machine in crowded traffic and on uneven thoroughfares. When deep sand is encountered or rutty roads traversed, the gear and its linkage are subjected to abnormal stresses.

Before attributing lost motion to the gears, note if the wheel is secure on the steering column. It is possible that a worn key may be responsible for some of the looseness. Inspect the method of retaining the spider to the wheel rim and tighten any screws or bolts utilized. Next note if the bracket or bearing in which the column or shaft rotates has undue play. Where the shaft turns within a tube make sure that its supports are not loose. It is a good plan to lubricate the bearings of the control rods when these members are contained within the tubing.

Having made sure that there is no undue stiffness in the operation of these members and that they are well lubricated, test the hand wheel and note the amount of play. This play or back lash is generally caused by wear of the gears or the bearings. Lost motion should not be confounded with wear of the linkage and, to properly test for back lash, hold the ball arm securely and try the wheel. It is possible that the lost motion may be due to the linkage and not caused by worn gears.

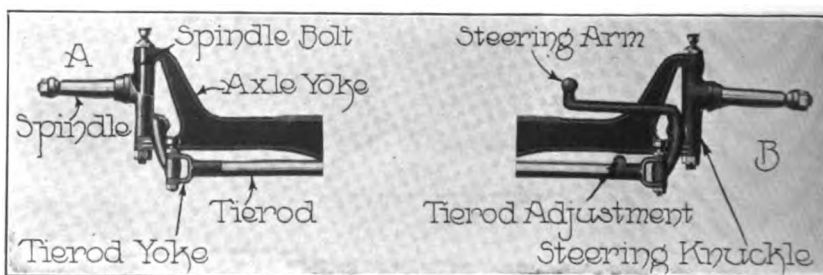
Adjusting means are generally provided, making it possible to change the gear relations

and bring the parts into closer engagement. A steering gear of the worm and gear type is shown in an accompanying illustration with the components utilized in making adjustments lettered. It will be noted that a notched nut is provided and that it is locked by a dowel screw. To tighten up the bearing or to eliminate end thrust of the column, remove the dowel screw and turn the notched nut to the right. In making the adjustment, as well as with all others, jack up both front wheels clear of the floor, as this will prevent stresses to the steering gear and linkage, which might otherwise ensue with the wheels on the ground.

If it be found that backlash of the gears is present, it may be reduced by turning the bushing where the ball arm shaft enters the gearcase. As rotating this bushing lowers or raises the steering post, the bearing supporting the end of the shaft should be loosened from the frame sufficiently to allow replacing or removing shims between the bearing and the frame, also to prevent cramping of the shaft in the bearing.

When adjustment of the bushing fails to correct lost motion, the ball arm shaft will have to be removed and turned through an angle of 180 degrees, which will bring an unworn section of the gear into mesh with the worm. Before attempting this work the ball arm should be removed, which operation is accomplished by loosening a nut and bolt, and disconnecting the drag-link. Before replacing the arm it will be necessary to file a notch through the upper corner of the squared section of the shaft, diametrically opposite to the original notch, so as to permit the bolt, which retains the assembly, to be replaced.

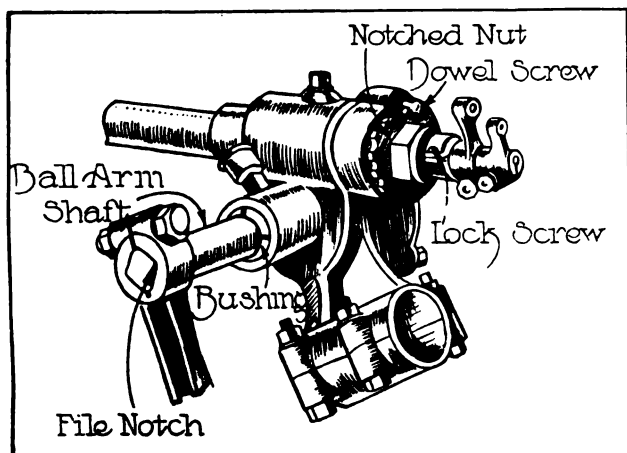
The larger illustration shows the steering gear assembly utilized on a well known make of



Depleting Components of the Front Axle in Which Lost Motion Should Be Eliminated.

car, which is of the worm and gear type. To eliminate play the wheels should first be jacked up, then the clamping bolts A and B should be

loosened. Next, turn the slotted adjusting nut to the right until play is eliminated. Turn the wheel around as far as it will go and adjust the worm



End Thrust of the Steering Column Is Eliminated by Means of the Notched Nut.

gear by turning the eccentric bushing on the ball arm shaft. This adjustment should be made with the wheel in the extreme right and left positions, as the wear occurs in the centre.

If the bushing has been adjusted several times and the play remains, it will be necessary to displace the ball arm by first removing the clamping bolt C. The steering wheel is then turned 1.5 times around to present one of the surfaces, of which there are four. The adjustment is made as previously described. It will be noted that the method is similar to that employed with the first named gear. The gears should be packed in a suitable grease and all nuts and bolts tightened securely.

The next step in the inspection of the steering mechanism is the draglink. Generally the end attached to the ball arm shaft is adjustable. Remove the cotter pin and screw out the adjusting plug, clean the parts and repack with grease. Lost motion is eliminated by screwing in the plug, and be sure to replace the cotter pin. The connection at the steering arm should be treated in a similar manner, and if boots are utilized they should be cleaned and repacked with grease.

Coming next to the front axle: Chock the wheels between the steering knuckle and the axle to prevent wear of the spindle bolt being confused with lost motion in the tierod. The tierod bolts may be respon-

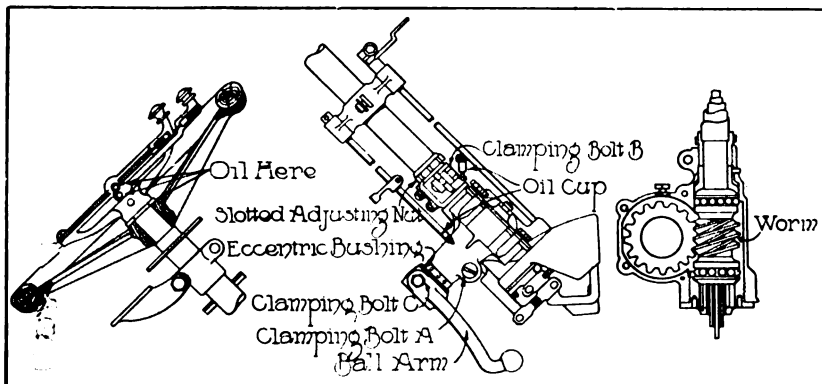
sible for lost motion, and the yokes generally are provided with removable bushings. If considerable wear exists it will be better to fit new bolts as well. If the members are in good condition, displace, clean and refill the grease or oil cups, making sure that none of the passages are clogged.

Under the head of steering mechanism should be included the spindle bolts, those members retaining the knuckles. Displace and examine these members if only for cleaning. By removing the chocks previously referred to and rocking the wheel, it can be determined whether or not new bolts will be needed. The knuckles are usually fitted with bushings, and new members, as well as bolts, are not expensive.

Before lowering the wheels to the floor, test the action of the steering gear very thoroughly. It should move freely, and if not, the adjustments should be gone over to note the cause of binding. It frequently happens that a gear that operates easily when the wheels are jacked up, will be stiff when the wheels are carrying a load. Do not hurry the work on the steering mechanism or its linkage. Be thorough in every detail, and after the trial trip go over all nuts and bolts, to make sure they are snug. The careful, experienced motorist gives the mechanism frequent attention.

The Long Island Motor Parkway was opened for the season April 4. The road runs from Queens to Lake Ronkonkoma, a distance of 45 miles, and the particular feature is that it is without speed traps or dust. All grade crossings have been eliminated for the first 30 miles, this involving the bridging of three railroad branches and two trolley lines.

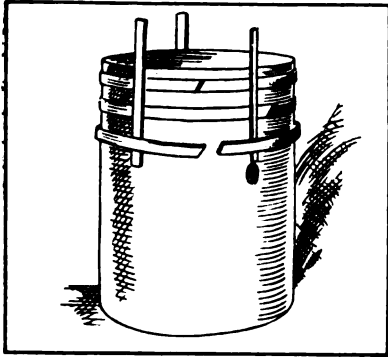
The Automobile Club of Utica, N. Y., plans, among other improvements, to place about 200 road signs in vicinity of that city this summer.



Conventional Type of Steering Gear with the Parts Utilised in Adjusting Lettered.

MOTOR COMPONENTS REQUIRING ATTENTION.

WHEN dismantling of the motor is necessary to make replacements and adjustments, a knowledge of the procedure will be essential. As-



To Remove Rings Insert Thin Strips of Metal as Shown.

suming that new bushings are required for the wristpins, new rings are to be fitted and bearings are to be taken up: The first step is to drain the water from the circulating system, shut off the supply

of fuel to the carburetor and disconnect the main pipe. Next remove the unions of the oil pipes leading to the dash indicator, if they be used, and, if a coil be employed in the ignition system, disconnect the leads, tagging them if not familiar with the wiring plan. Make sure that the exhaust manifold is free from the exhaust pipe, and all other components, such as the bolts retaining the power plant, for example. A little study of the method of suspension will simplify the work. If the motor is to be removed from the frame, a falls and tackle will be needed, or several persons may lift it out and onto the motor stand.

Remove the following components in the order named: Spark plugs, valve plugs, valve springs, valves, intake manifold and carburetor, exhaust manifold, oiler (if exterior member), fan belt, lower half of crankcase, inlet and outlet water pipes and cylinders. This order may be varied slightly, however, according to the design of the motor.

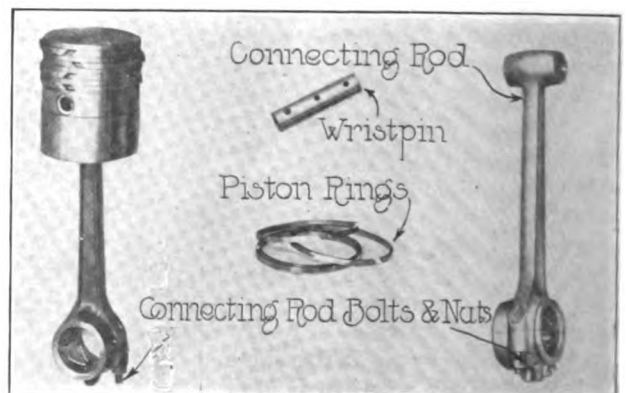
To remove the cylinders, loosen the nuts, and if the cylinders are cast en bloc, two or more persons may be necessary. If single or in pairs, one person can displace them by standing on the frame and lifting upward. This work should be done carefully to prevent injury to the pistons and rings. Place the cylinders to one side for cleaning, marking them if not numbered, and disconnect the connecting rods at their large ends. Note their position so as to insure correct replacement and number the rods with a prick punch if not marked. As the subject of worn bearings, including wristpin bushings, etc., is treated elsewhere, it will not be discussed herein.

Clean the pistons and rings thoroughly before inspecting these members. As the rings are fragile and broken easily, care must be taken in removing them from the piston. By using three old hacksaw blades or thin strips of metal, inserting these as shown in an accompanying illustration, the ring can be slipped off the piston easily. Start with the top ring in removing and put on the bottom ring first in replacing. Clean all carbon from the piston, rings and their seats and note if the edges bearing against the cylinder walls are bright. Discolored spots indicate that the gas is escaping, and that the walls of the cylinder are not true or the rings do not fit properly. Relative to fitting new rings: The work will require the services of an expert, and as the pistons are out of the cylinders it will be a simple matter to take them to the repairman for his opinion.

In an accompanying illustration is shown the Leak-Proof piston ring, made by the McQuay-Norris Manufacturing Company, St. Louis, Mo. This ring is specially adapted to motors with which compression troubles, as well as leakage, are experienced, and, being a two-piece construction with no open joints, gas cannot escape. The company supplies very complete details as to fitting, etc. The writer knows of many instances where the use of the Leak-Proof ring has cured ring troubles, as well as greatly improved the efficiency of the motor.

In replacing the old rings on a piston, lubricate them and their seats and make sure that the openings do not register. If three rings are employed, space the openings equidistant. Pinned types will not require this precaution.

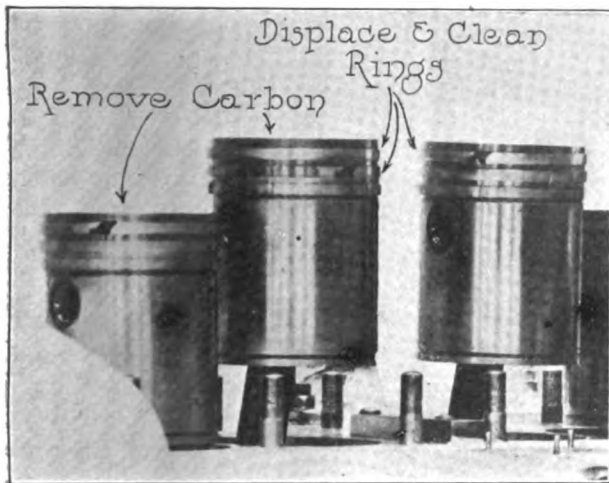
Assuming that the connecting rod bearings and wristpins have been scraped in or adjusted



Showing Assembly of Connecting Rod, Piston, Rings and Wristpin, also These Members Separately.

for lost motion: Before replacing the cylinders it will be well to note if the axis of the bearing is exactly in line with the wristpin. The centre line of the wristpin bushing will frequently be found to be inclined toward the centre line of the crankshaft, owing to the fact that the connecting rod is slightly out of alignment. It is not always easy to detect the defect before assembling and to facilitate matters the device shown in an accompanying illustration will be of service.

The method indicated at A consists of clamping the rod to a round metal bar supported on a surface plate and using a steel try square as shown. That at B illustrates another manner, it being assumed that the upper surface of the crankcase is planed true. Any variation should be corrected by the bearings, for if the piston is not in alignment with the bearing, undue wear of the walls of the cylinder will result.



Motor with Cylinders Removed, to Indicate Places Subject to Carbon Deposits.

In replacing the cylinder on the pistons, the connecting rod should be placed in a vertical position. The work will require two persons, at least, one to steady the pistons and compress the top ring, while the cylinder is lowered. Care must be taken not to attempt to force the cylinder over the rings, for if they be fully compressed and the cylinder held vertically, it will be an easy matter.

The work is simplified when a piston ring clamp is employed. These may be purchased or made. To make a clamp, employ a flexible strip of metal slightly larger than the circumference of the ring. Form the strip into a circle and bend the ends so that they can be gripped by a pair of pliers. By slipping the clamp over the ring and compressing it by the pliers, the ring will be seated, enabling the cylinder to be fitted. It is

best to have one person operate the pliers while another slips cylinder on the piston.



Leak-Proof Piston Ring Designed to Improve Compression.

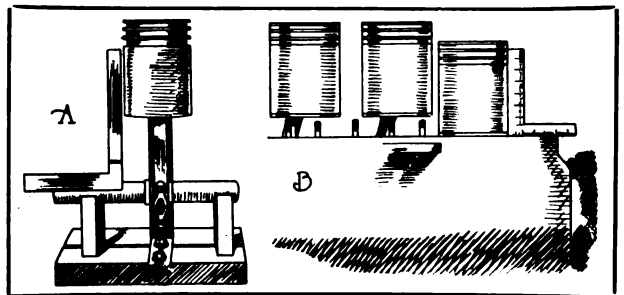
In reassembling the exterior components of the power plant special pains should be taken to insure that the exhaust and intake manifolds and pipes are proof against leakage. If gaskets are utilized do not use the old members unless in perfect condition, as new ones are inexpensive. It should be borne in mind that any leakage of air in the intake assembly between the carburetor and the cylinders will result in the motor missing at low speeds, as well as upset all attempts to adjust the carburetor for low and high speeds.

Where parts are subject to heat the gaskets must be of a non-burning material. There are a number of excellent makes marketed and these may be obtained in the desired sizes at any supply house. The copper-asbestos gaskets made by the Victor Manufacturing & Gasket Company, Chicago, are carried by the supply houses, and come in assorted sizes and for all kinds of work.

If gaskets are employed between the cylinders and upper crankcase, new ones can be made of heavy wrapping paper. These can be cut out by placing the material over the open end of the cylinder and tapping the edges lightly with a ball peen hammer.

With some types of motors felt gaskets are employed between the halves of the crankcase, and unless equipped with a gasket cutting tool it is best to purchase one from the factory or nearest service station, although they can be obtained from concerns making a specialty of felt gaskets.

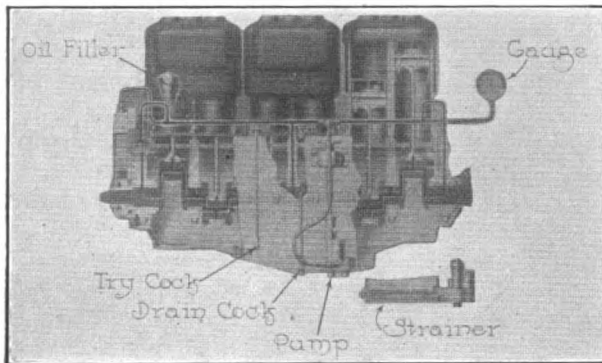
Lakewood, N. J., is to have an automobile race track and plans are now being completed for its construction. About \$20,000 has been raised.



Method of Verifying Alignment of Bearings with Wristpin, Etc.

CLEANING THE LUBRICATION SYSTEM.

TO MINIMIZE the friction of the working parts of the power plant manufacturers of lubricating oils have spent vast sums in experi-



Illustrating Components of Constant Circulation Lubrication System.

mentation to obtain a lubricant that will fulfill the peculiar requirements of the internal combustion engine. Assuming that the motorist employs nothing but the best grade of oil, efficiency will not be obtained unless it is clean and supplied in the proper quantity to the working parts.

It should be borne in mind that after the lubricant has been in service for some time its efficiency will be impaired because of the foreign elements collected in the operation of the motor. While the majority of lubricating systems include a screen for filtering the oil, it is important that the old lubricant be drained from the crankcase or reservoir and the last named thoroughly washed with kerosene. It will be surprising how dirty the lubricant will become after continued service. This cleaning of the crankcase or reservoir and refilling with fresh, clean oil, should be performed frequently and in accordance with the instructions of the maker.

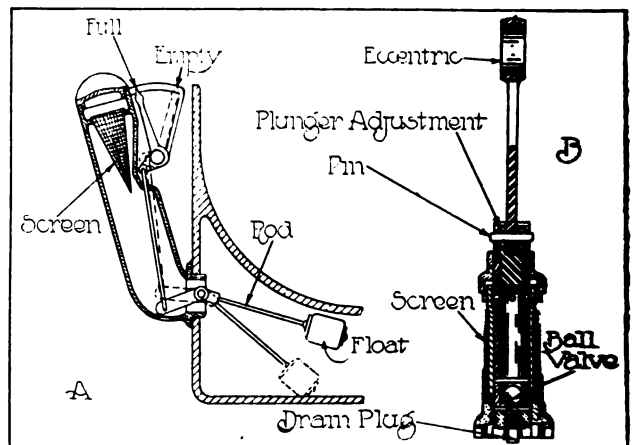
Lubrication systems may be divided into two general classes, splash and pressure, and these combined. The principle of the splash system is one in which the connecting rods dip into an oil reservoir, splashing the lubricant to the working parts of the motor, and the system may include means for feeding the lubricant to the crankcase. The pressure or constant circulating principle involves the delivery of the lubricant from the reservoir through piping to the main bearings, wristpins, etc., from which the excess oil gravitates back to the reservoir, whence it is again taken up by the pump and again circulated. The splash-pressure system is a combination of the two above described.

Owing to the different locations of the strainers, pumps and gauges, other than general directions for their care will not be given. Generally, the instruction book gives a diagram of the lubricating system and states the method of displacing the screen and adjusting the pump. The filter will need removing and washing in gasoline and all components of the pump mechanism should be inspected for undue wear.

If the motor has been in service for some time it is advisable to clean all oil pipes by running gasoline through them. Similarly, the devices indicating the supply of lubricant in the reservoir should be tested to note if they register properly. An accompanying illustration shows the mechanism actuated by a float, also a sectional view of a plunger pump and the parts employed in adjusting it.

If the power plant has been thoroughly overhauled and the bearings taken up, it will be necessary to increase the supply of lubricant over normal until the bearings have worn in. To do this a knowledge of the pump mechanism will be essential. The plunger type of pump is adjusted by increasing the stroke of the plunger, permitting it to draw in and force a larger amount of oil to the working parts. The mechanical oiler is used on old cars and is adjusted in a similar manner.

In the Classified Buyers' Guide will be found the names of makers of high grade motor lubricants and any of these will forward information



Lubrication Systems: A, Arrangement of Mechanism Indicating Supply in Reservoir; B, Components of Plunger Pump and Parts Utilized in Adjustment.

as to the best grade of oil to employ with the motor. Price should never be considered in motor lubricants, as a cheap oil is dear at any price.

REACHES FOURTH EDITION.**Popular Demand for Interesting Book Published by Empire Automobile Company.**

The Transcontinental Empire book, which describes in pictures and story the 4000-mile Indiana-Pacific tour of last July, has just gone into its fourth edition, and, according to the publisher, the Empire Automobile Company, Indianapolis, Ind., "the peak load" of the demand does not yet appear to have been reached. If the popularity of the book does not wane, its circulation will soon reach the proportion of the "best sellers", when editions ran into hundreds of thousands.

While much space is devoted therein to the performance of the Empire car, the main feature is a description of the Indiana-Pacific tour as a whole. The more difficult and interesting regions are quite graphically described and illustrated; the various types of country encountered are portrayed, and the motoring conditions are set forth in a manner that gives the reader glimpses of the wonders and pleasures, as well as the hazards and hardships met with on transcontinental journeys.

One of the interesting facts brought out by the demand for the book is that there are large numbers of motorists who are planning transcontinental tours for this summer and in 1915. Scores of those who have written the Empire company have told of their plans and, in many cases, they have asked for additional information and advice. Harlow Hyde, of the company, who made the trip, took the pictures and wrote the book, has been much surprised to learn of the widespread interest in such travelling. The book is mailed free upon application to the company.

DEMISE OF J. ELWOOD LEE.**Well Known Tire Manufacturer Is a Victim of Heart Failure.**

Word has been received of the death of J. Elwood Lee, inventor of the Lee tire and president

of the Lee Tire & Rubber Company, Conshohocken, Penn. Death was attributed to heart failure. In 1905 Mr. Lee went into the motor car tire business and founded the Lee Tire & Rubber Company. He was also vice president of Johnson & Johnson, Philadelphia and New Brunswick, N. J., producer of surgical instruments. Mr. Lee is survived by his widow and three children.

PENNANTS SHOW DESTINATION.**Pittsburg Department Store Adopts Novel Method with Its Fleet of White Trucks.**

In order that the public may know the wide radius within which goods are delivered by the 40 White trucks, made by the White Company, Cleveland, O., and operated by the Kaufmann & Baer Company, Pittsburg, Penn., the firm has



Fleet of White Trucks Operated by the Kaufmann & Baer Company, a Pittsburg Department Store.

adopted the use of pennants. These show the destination of each vehicle, somewhat after the manner in which signs on street cars indicate the districts served.

The Kaufmann & Baer Company has one of the newest department stores in that city, and the plan was inaugurated to direct attention to the service which might be expected. All of the trucks are uniform in design and the bodies, which are unusually attractive in appearance, have actual reproductions of the new store building on each panel. Two pennants are attached to staffs at the front of each truck.

The following concerns have been elected to membership in the Motor & Accessory Manufacturers: T. P. Howell & Co., Newark, N. J.; the Perfection Spring Company, Cleveland, and the Pittsburg Steel Products Company, Pittsburg, Penn.

CARBURETORS AND THE FUEL SYSTEM.

EVERY motorist who drives his own machine should have at least a working knowledge of the carburetor fitted to his motor so as to be

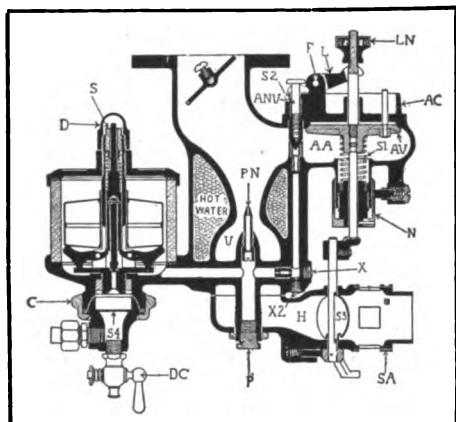


Fig. 1—Sectional View of Stromberg Carburetor.

able to clean and adjust it during the overhaul and throughout the driving season. Carburetors are not so complicated as some imagine and a little study of the design utilized should enable one to adjust the instrument so as to obtain an efficient as well as an economical mixture. Views of standard makes are presented herein with their components lettered, which will prove of service in making adjustments or cleaning.

Rayfield.

The adjustment of Rayfield carburetors is simple. At Fig. 2 is illustrated an exterior view of the water jacketed type with the components utilized in adjusting clearly lettered. The low speed is set first by turning the low speed screw to the left until the arm member above it and slightly to the right just breaks contact with the cam above that. Next turn the slow speed screw 1.5 turns to the right, open the throttle about one-quarter, prime the carburetor and start the motor. Close the throttle until the motor runs slowly without stopping, then turn the low speed screw to the left, cutting down the fuel, and do this one notch at a time until the engine idles smoothly. The desired speed may be obtained by the adjustment of the screw in the top arm to the left, using a screw driver.

Open the throttle slowly until wide open. If the motor backfires, turn the high speed adjusting screw to the right, a half turn at a time, until each cylinder fires evenly. Should the motor not backfire, turn the high speed screw to the left until it does, then to the right until it runs smoothly. This insures economy of fuel and efficiency as well.

One is apt in setting the Rayfield, for the first time, to obtain too lean a mixture, which makes it sensitive to climatic changes. The low speed should not be touched in setting the high, but should the motor backfire with the throttle about one-quarter open, the automatic air valve adjustment should be turned to the right, a turn or two, increasing the tension of the spring and decreasing the amount of air slightly. For very high altitudes the maker recommends setting the air valve so that it seats a trifle lighter and cutting down slightly on the low and high speed fuel adjustments. It should be remembered that the automatic air valve must be seated when the motor is idling. It is further suggested that starting is made easier when the throttle is about one-quarter open. The float chamber is drained by removing the plug member.

Stromberg.

The Stromberg carburetors are produced in a number of types, having single and dual jets. They are not difficult to set, as there are but two adjustments, a low

and a high speed, these components being shown at N and LN in the sectional view at Fig. 1. As the adjustment of other types is similar a description of the design illustrated will serve all practical purposes.

Since it is possible that climatic changes may compel a slight alteration of the original setting, it is well to have a knowledge of the work involved. The low and high speeds are adjusted separately. The proper low speed mixture is obtained by turning the nut N up or down until the low speed spring SL seats the valve AV lightly. By this is meant that the tension is sufficient to retain the valve on its seat. It is important that the high speed spring should have about .06125 inch play. By rotating the nut LN up or down, and by turning it one notch at a time, the desired, even idle, operation of the motor is secured. This is obtained with the spark retarded and the throttle but slightly open. After the motor has become warm, retard the throttle and note if it runs as slowly as desired. If not, move out the screw acting as a stop for the lever. To increase the speed move in the screw.

To adjust the high speed, advance the spark and open the throttle, and if the motor backfires or shows an indication of a weak mixture, turn up the nut LN a notch at a time. If too rich, rotate the nut in the opposite direction. It is important that the high speed spring have at least .03125 inch play when the motor is idling. The season adjustment is shown at SA and this should be open in warm weather.

The height of the float and proper size of the nozzle is determined at the factory and should not require any attention. If it becomes necessary to displace the nozzle it is accessible by taking off the nut P, after which the nozzle PN can be removed with a screw driver. The float chamber may be drained by opening the petcock DC. Should this fail to remove obstructions in the fuel line above the inlet pipe, take off the nut C and clean the filter.

Too much air is usually denoted by the motor being hard to start; by its speeding up upon closing the air valve; by the engine being slow to respond when opening the throttle, and by back firing. A lack of fuel presents similar symptoms. Too much fuel and not enough air is known by the motor speeding up when the air valve is opened slightly; by missing when the car is being operated slowly on the level, and by failing to pick up when the clutch is disengaged. The last named condition indicates a very rich mixture.

Schebler.

Schebler carburetors are made in several types, these including models F, L, O and R. Models O, L and R are shown at Figs. 3, 4 and 6 respectively, with their components lettered. Models F and L have single jets, although provision is made for adjustment of the high, intermediate and low speeds, and both are fitted with the lift type of needle, this member providing more fuel and proportionately to the speed of the motor.

To set the model L the low speed needle valve, Fig. 6, is screwed in until it seats firmly. Next, unscrew it

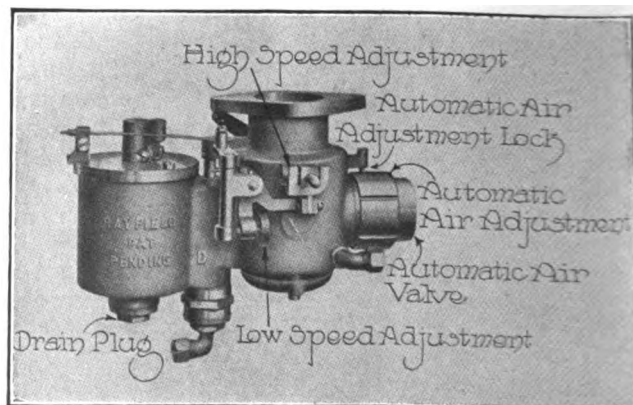


Fig. 2—Rayfield Carburetor, with Components Utilized in Adjusting and Cleaning Lettered.

about a turn and a half, and prime or flood the carburetor. Open the throttle slightly less than two-thirds way and, with the spark retarded, start the motor. Change position of low speed needle until the engine

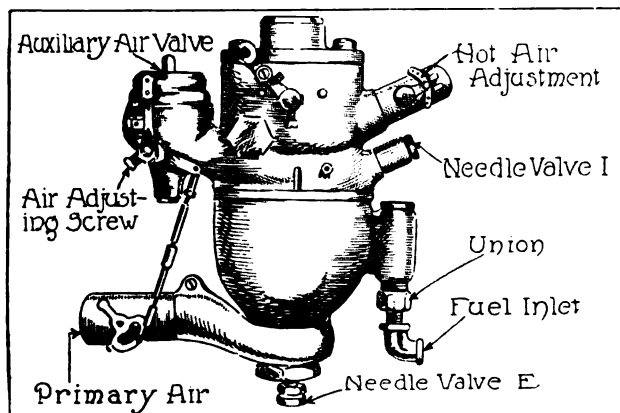


Fig. 3—Model O Schebler Carburetor, a Two-Jet Construction.

runs smoothly. If it operates too fast, move out the adjusting screw, which restricts the opening of the butterfly valve. If the motor stalls, move the screw in.

The low speed member must not be disturbed in making the adjustment of the intermediate and high speeds. These are obtained by moving the arms or pointers on the dials, of which there are two. The intermediate speed is adjusted first and has three numbers, 1, 2, 3. Move the arm or pointer about half-way from the figure 1 toward the figure 3. Next advance the spark and open the throttle so that the roller moving with the track like member beneath the dials is in line with the intermediate speed dial. It is important that the auxiliary air valve seat lightly.

If the motor backfires with the spark and throttle in this position, increase the amount of fuel by moving the arm towards the figure 3, or if the mixture be too rich, back toward the figure 1. A little experimentation will secure the proper position. Noting the color and odor of the exhaust also will be of value.

The high speed is secured by utilizing the other pointer and dial, and with the throttle wide open. The maker of the Schebler recommends cutting down the supply of fuel until the motor shows signs of back firing, then increasing the amount until the engine runs smoothly and evenly. Turn the low speed member a notch at a time and note the results. In adjusting the arms, do not move these more than half-way at a time between the graduated divisions or marks. Slight variations may be necessary in setting the speeds as, frequently, apparent proper operation with the motor idle will not obtain the desired results under load.

Model F.

The model F is similar to L, differing in that but one dial is provided. The low speed is set in the same manner, but with the intermediate the spark is advanced about one-quarter and with the throttle one-third open. In this position cutting down the fuel by screwing in the needle or slow speed member should not result in speeding up the motor. This indicates that the point of the needle is too large. The engine should run smoothly, and will, if the needle is of the proper size. As previously pointed out, the proper needle is inserted at the factory and the above suggestion is made for the benefit of those who fit new carburetors.

The adjustment for the high speed is secured by advancing the spark one-quarter and with the throttle open to its maximum. The arm or pointer should stand at the figure 1 on the dial. If the motor backfires it indicates that more fuel is required, and this is obtained by moving the arm toward the figure 3. If the back-firing continues and with the arm at 2, increase the tension of the spring of the auxiliary air valve: that is, cut down the air supply.

Model O.

The model O is supplied with two jets, these being shown at Fig. 3 by the letters I and E respectively. In adjusting this type the auxiliary air valve is seated

lightly and the needle members I and E screwed in until seated firmly. Do not use pressure. Next turn the valve E to the left about three turns, open the throttle about one-third and start the engine.

After the motor is warm, turn the valve E to the right until it operates smoothly and slowly with the throttle nearly closed. Open the throttle slowly until about one-third open and if the motor backfires screw in the adjusting screw until it runs evenly. Next open the throttle wide, and if the motor backfires at speed, turn the needle member I to the left until the missing ceases. The second jet is not utilized until the car attains a speed of from 18 to 25 miles an hour, or a motor speed of from 700 to 1000 revolutions a minute. The needle or jet I is not difficult to adjust and when set for high speeds exposes from one to four threads of the knurl.

To clean the Schebler models described the nut retaining the bowl or float chamber is removed, although sediment in the spraying nozzles can sometimes be displaced by cranking with the primary air passages closed. This exerts considerable suction, which will invariably remove small particles.

Model R.

Two adjustments are provided in the model R Schebler, the latest design, which is shown at Fig. 4. Turning the air cap A to the right augments the supply of fuel; in the opposite direction, decreases the amount or makes for a leaner mixture, in that the needle valve is lowered. The high speed is regulated by the tension of the auxiliary air spring. The low speed needle is indicated by the letter E. The adjustment is obtained by means of a Bowden cable W from the steering column of the car, the wire being connected to the bell crank lever B, which raises or lowers the needle as desired. The lever on the steering column is so attached that when in a central position the mixture is correct for low speed. The operating position is when the boss of the lever is against the stop. The lever should then register with the words "Lean" or "Air". This permits of the driver altering the position of the needle valve to meet atmospheric changes, and to enrich the mixture for starting when the motor is cold.

The carburetor shown at Fig. 5 is utilized in a popular make of machine and has but one adjustment, that of the needle valve, which is operated from the seat. As the components are lettered, a little study of the construction will enable one to make any needed adjustments or cleaning.

Cleaning the Fuel System.

The writer advocates the cleaning of the fuel system in the spring overhaul, and especially if the car has been inoperative for a considerable period. All fuel should be drawn from the sup-

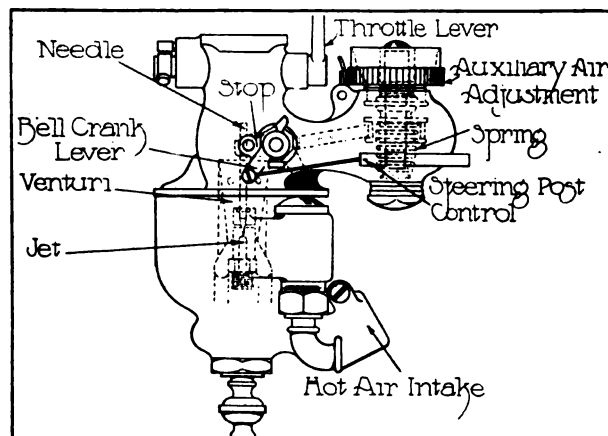


Fig. 4—Model R Schebler, Having Two Adjustments.

ply tank and it will be useful for cleaning purposes. The tanks ought to be thoroughly cleaned, and if the machine has seen considerable service,

all supply pipes should be disconnected and examined for chafed or worn places.

The gravity system is easily inspected by ex-

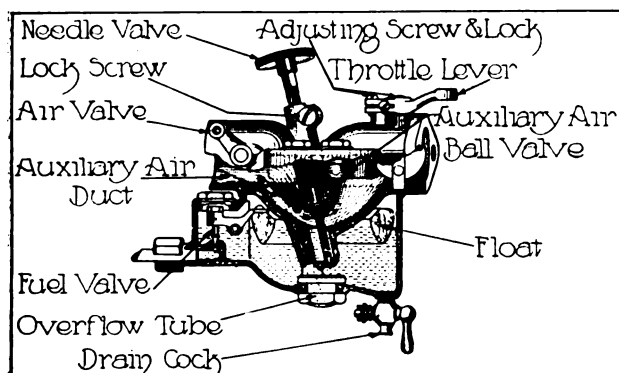


Fig. 5—The Design Employed with a Popular Make of Machine.

amining the petcocks, filters and unions. If the fuel container is located under the seats, note if it be firmly retained. It may be that some of the retaining screws or bolts are loose. Leads from the tank to the carburetor or indicating devices should be secured to prevent play or vibration.

The pressure feed system should be gone over after disassembly and tested for leakage. Utilize the hand pump to obtain a few pounds pressure and test all joints and connections with soap suds. This method is more satisfactory than oil as minute leaks are detected more readily. The adjustment of the pressure regulator and pump should be performed according to the type employed. Where the pressure is obtained from the exhaust, the ball check valves should be removed and cleaned, as more or less soot may be present, making it necessary to utilize the hand pump when the machine is being operated slowly.

Too much emphasis cannot be laid upon the importance of straining all fuel when the supply is replenished by the owner or at a garage. It is better to take a little more time to see that the gasoline is filtered properly than to be delayed on the road by cleaning a carburetor. It should be borne in mind that the spray nozzles have very fine apertures and are easily clogged by foreign elements.

HANDLES HARDMAN TIRES.

Locates Distributor for Southern and Western New England in Hartford, Conn.

The Hardman Tire & Rubber Company, Belleville, N. J., announces that the distribution

of Hardman tires in southern and western New England will be handled by the Hardman Tire Agency, which has opened a fully equipped store at 177 Allyn street, Hartford, Conn. Walter Gallup, formerly of Hyde Park, Mass., who has been in the employ of the company at the factory, is general manager, and already reports a generous demand for these tires.

The Hardman tire is made by the single cure wrapped tread process, which, because the tire is built and cured simultaneously, in one operation, is held to cause the component parts to adhere more uniformly. It is maintained that the different layers are not likely to separate, and that the result is a much longer life.

Particular attention is drawn to the Hardman Sure Grip tread, which consists of a series of indentations on either side of parallel bars along the tread, so arranged as to provide an especially effective tendency to prevent spinning on slippery surfaces. This is held to present additional qualities, in that the extra heavy traction tread makes for greatly increased mileage.

Entry blanks calling for cars to be used in conveying the orphans to and from the playgrounds on their 10th annual outing, to be held June 4, have made their appearance along Automobile Row, in New York City. The following donations have been received: Stutz Motor Car Company, two touring cars; Poertner Motor Car Company, three touring cars; Henry Caldwell, one touring car; H. M. Hanks, Springfield, cash contribution; S. A. Miles, \$25; E. Lascaris, \$10, and the Locomobile Company of America, \$25. Those wishing to contribute to this cause may

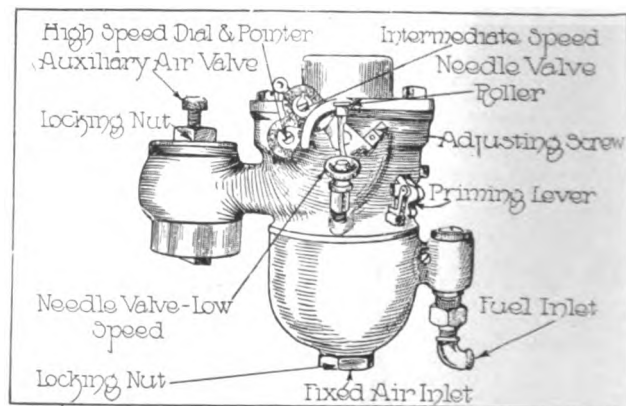


Fig. 6—The Model L Schebler, Having Three Fuel Adjustments.

send their donations to the association's secretary, A. L. Prindle, 7 East 42nd street, New York City.

CHESTER DEMOUNTABLE RIM.

Designed for Ford Cars and Requires No Alteration of Wheel.

Many owners of Ford cars desiring to equip their machines with demountable rims have decided that the expense involved in altering the wheels, purchasing new casings, etc., does not warrant the outlay. Many times an owner does not care to lose the services of the car while the work of altering the wheels is being performed. The problem of equipping the Ford automobile with demountable rims, and without altering the wheels, has been solved by the Chester Demountable Rim Company, Fall River, Mass., manufacturer of the Chester rim, shown in an accompanying illustration.

The construction differs from conventional practise, in that no cutting down of the spokes or building up the felloes, drilling, fitting new bands, etc., are necessary. Another quality of the design is that there are no bolts to work loose on the felloe and that only five nuts are utilized. Rings, levers, etc., are also eliminated.

A feature of the Chester rim that will appeal to owners is the statement made by the maker that the equipment can be attached in about 20 minutes. The regular clincher rim is not disturbed, as the retaining construction shown at D is easily fitted to the old rim as indicated at C. The new rim A has spot welded edges and is slipped over the old member as illustrated at B. The rim and its casing is secured by a simple clamp and locking nut, there being five of these members. Their removal and replacement is accomplished by a double socket wrench.

Another quality of the Chester rim is that the same size shoes, 32 by three inches, are used all around. This oversize makes for easier riding qualities and tire economy, and the company is prepared to supply some interesting figures on tire mileage obtained with its equipment.

NOT GOING TO LYONS.

Hazard Motor Company States There Is No Foundation in the Report.

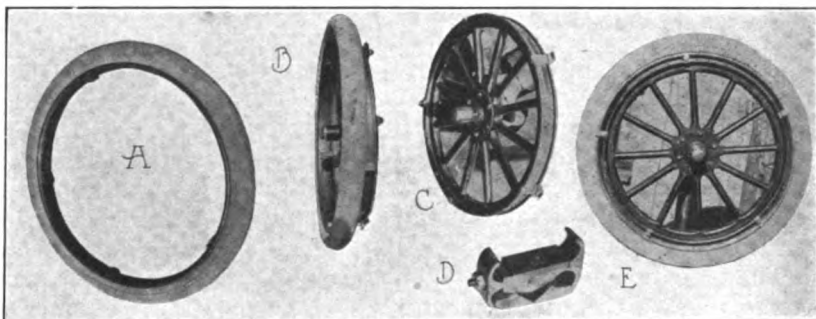
Elsewhere in this issue will be found the substance of a dispatch from Lyons, N. Y., in which

it was suggested that the Hazard Motor Manufacturing Company of Rochester, N. Y., was interested in a plan looking toward its removal to the former city. Since that section of the magazine was printed, The Automobile Journal has been advised by the Hazard company that the report is not in accordance with the facts. This is taken to mean that this company does not contemplate removal from its present location.

INFORMATION ON LUBRICATION.

Manufacturer of Non-Fluid Oil Publishing Interesting Booklet for Owners.

"Where can I find a book that will give me the information I need regarding the lubrication of my car?" is a question often asked by the car owner, especially the new owner. Having learned by experience that there is a large demand for enlightenment on this important subject, the N. Y. & N. J. Lubricant Company, 165 Broadway,



Chester Demountable Rim for Ford Cars: A, Rim with Spot Welded Edges; B, Rim Being Demounted; C, Attachments in Position to Receive Rim; D, Members, Which Hold Rim to Wheel; E, Rim Locked in Place.

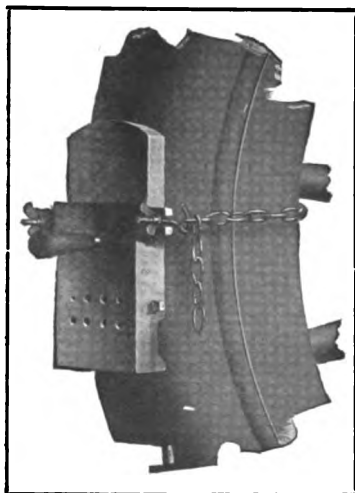
New York City, maker of Non-Fluid oil and Motorol, has recently issued a revised edition of its booklet, "Lubrication of the Motor Car".

In this booklet the problems of motor car lubrication are thoroughly covered, and the text matter is profusely illustrated with drawings of the different parts of the car. Among other things are some hints as to the proper lubricants to use, and some simple tests for distinguishing the difference between the various grades. A particularly valuable feature is a complete lubricating chart inserted in the centre, designed to show at a glance every part requiring lubricant. Accompanying this chart, and listed in tabular form, are the names of the different parts arranged to show the intervals at which lubricant should be applied.

A copy of this valuable booklet will be mailed free upon application to the company, if the writer mentions The Automobile Journal.

PREPARING THE TIRE EQUIPMENT.

THE experienced motorist does not neglect inspecting the tires and rims, and the removal of these members is among the first steps of the overhaul. It insures that the tire equipment will be given the attention necessary and provides ample time to make any repairs needed or have the work done by the expert. While it would appear that the removal of four apparently good shoes from the rims involves useless labor, it should be borne in



Wizard Vulcanizer.

mind that the interior of a casing cannot be judged by its exterior. Many times a shoe that appears perfect from the outside will be found to have loose fabric. Then again punctures may have allowed moisture to penetrate to the inner fabric, laying the foundation for a blow-out.

The type of rim employed will determine how best to remove the tire, and with some designs the casing may be displaced more easily when the rim is on the wheel. If it be found that the shoe is what is termed frozen, considerable care will be necessary to prevent injury in its removal.

Clean the shoes and examine their interior for loose or broken fabric. Discolored interiors indicate, as a rule, that water has found its way through a puncture and that deterioration of the fabric has begun. The section should be backed up by cementing fabric, or the casing should be taken to the tire expert. If in doubt as to an old shoe have the tire man pass upon it.

Inspect the exterior very carefully for cuts and if any exist probe these to make sure that dirt or other foreign elements are not present, for if allowed to remain they will work through to the tread, causing it to separate from the fabric. Sand blisters, so-called because of their bulging appearance, are the result of neglecting cuts. Before attempting to vulcanize, all dirt must be removed and the rubber thoroughly cleaned.

All rims, clincher, quick detachable and de-

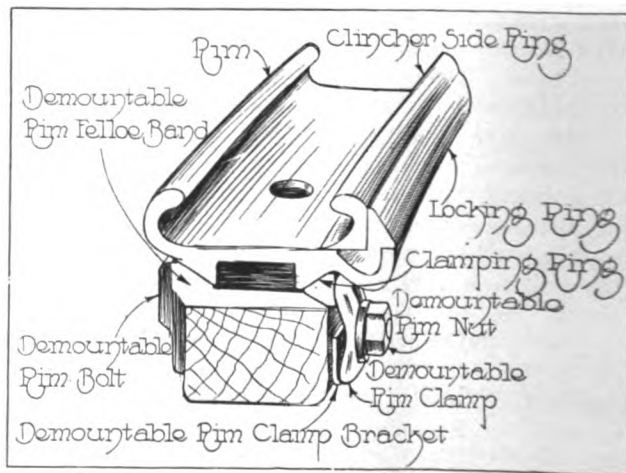
mountable, should be gone over carefully and any rough places smoothed up. Remove all rust and other foreign elements by the use of sand-paper or emery cloth and make sure that a clean, smooth surface is obtained.

Wipe the rims clean, then coat them with a rust resisting material. The tire makers recommend painting, etc., but the writer has obtained the best results with graphite. Use the powdered material and enough light oil to form a thick paste. Smear the mixture over rims, and, when they are of the quick detachable or demountable type, make sure that the locking and clamping rings, bolts, nuts, etc., are well graphited, as well as all crevices filled.

Next take a piece of waste or cloth and remove the surplus material. By rubbing, a fine polish may be imparted. Before replacing the tire, sprinkle a little powdered graphite on the rims and their locking mechanism. It will be surprising how easy it will be to remove a shoe and to fit a new one when the rims have been treated in this manner. The moisture resisting qualities are well known.

For the benefit of the new owner who has not utilized the demountable rim, the section view of a well known make will be of value in the work. The components are lettered and a little study should enable one to disassemble and reassemble the parts correctly.

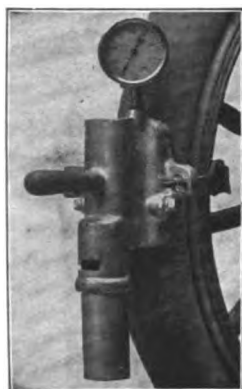
The inner tubes will require careful attention. If, in displacing the shoes, it is found that a tube is frozen to the casing, do not use force, but employ gasoline. Inflate the spare tubes, if not new ones, to make sure that a punctured tube has not been placed by mistake with those supposed to



Components of a Standard Make of Quick Detachable, Quick Demountable Rim.

be in good condition. Test the valves and replace all damaged or faulty members with new.

After repairing the tubes, place the spares in a tube bag and sprinkle the interior of the latter with soapstone. An accompanying illustration shows the progressive steps in properly folding a tube, and before folding it will be necessary to remove the valve stem to eliminate the air. A method of removing the air is shown at B. In securing the folds, strips of cloth or sections of an old tube can be utilized, as indicated at F.



Van Steam Vulcanizer.

The marketing of practical and inexpensive vulcanizing outfits enables the motorist to undertake successfully tire and tube repairs. These vulcanizers operate automatically and require little if any experience, and the instructions of the maker are easily followed.

The National Motor Supply Company, Cleveland, O., maker of vulcanizing equipments, is marketing the Wizard, shown in an accompanying illustration. It is of the automatic steam type, has a hollow body partly filled with water and sealed at the factory. A fire box filled with asbestos packing is cast in the bottom of the vulcanizer, and upon pouring a predetermined amount of gasoline or alcohol in the receptacle the fuel is absorbed by the packing. When the fluid is ignited, it burns with a blue flame and no smoke, a series of draft holes being open in the firing chamber. As the temperature is automatically controlled, the vulcanizer requires no attention after lighting, and it is stated that perfect vulcanization can be obtained in five minutes.

The Wizard has a vulcanizing face six inches long and three wide. It is curved to conform to a casing against which it is clamped by an adjustable chain held by special retainers. When tubes are to be repaired a plate is employed. The Wizard permits of repairing shoes without removing them from the wheel. The equipment is very complete, including rubber, cement shears, instructions, etc., packed in a neat wood box.

The Vanderpool Company, Springfield, O., manufactures vulcanizers for the owner, garage and repair shop. One of its portable types is shown in an accompanying illustration, and the Van, as it is called, utilizes steam for obtaining the proper vulcanizing temperature. As will be noted by the illustration, the equipment can be employed to repair a casing without removing

it from the wheel. It is also adapted for vulcanizing inner tubes. The same high grade material and workmanship is incorporated in the Van as is noticeable of the other equipment produced by this company.

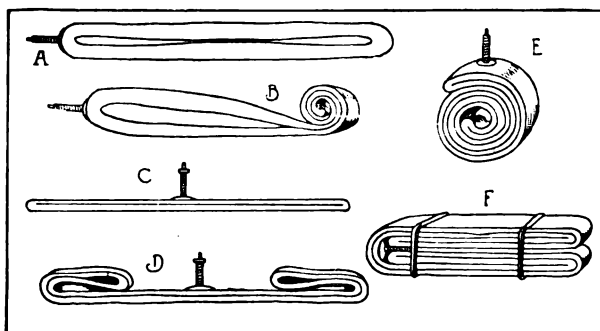
No consideration has been given to the inflation of tires, but the subject may be dismissed by calling attention to the importance of following the instructions of the maker. If new casings are to be purchased and carried for spares, they should be protected from the elements by a tire cover. In strapping or locking the extra members to the tire irons or supports, make sure that there is no play, as a new shoe can be ruined in a very short time by chafing.

HAS TWO COURSES.

Boston Auto School Offers Special Instruction for Those Who Desire It.

Particular attention is being drawn to the personal instruction afforded by the two courses offered by the Boston Auto School, 222 Columbus avenue, Boston, in a neat little folder issued recently. One of these is termed a driving course, in which instruction is given in the heavy traffic of Boston's city streets, as well as in the country and with the late car models. Individual attention is given to all students, and the driving is supplemented by a series of evening lectures by experts in their respective fields.

The shop course is held to be exceedingly practical. The school is maintained by Bonney & Greig, which also operates a repair shop, where cars are brought by the owners for attention and overhaul. The students work on these cars, under the guidance of expert repair men, thereby securing a practical knowledge of various machines and repairs. In addition, the company operates a service department for Rayfield carburetors and another for overhauling and adjusting magnetos. Instruction in these branches is supplied free to all shop students.



Showing the Progressive Steps in Folding a Spare Tube.

ELIMINATING WASTE IN COLE PLANT.

SPECIAL and improved machinery and devices to eliminate waste make for economy in the production of motor cars, and many of the

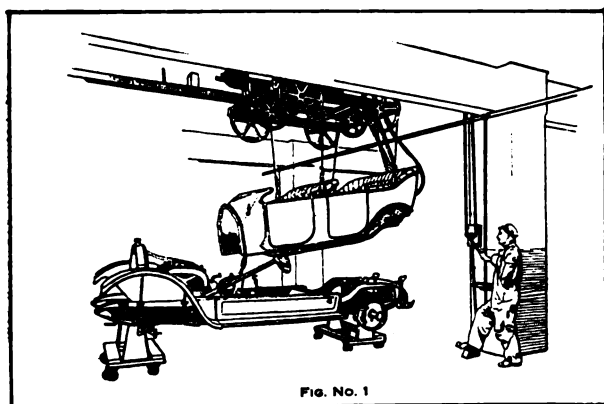


Fig. No. 1

machines are the design of efficient workmen. As they are not patented their operation is not known by the general public. To reduce the overhead expense is a problem that has been given serious consideration by the Cole Motor Car Company, Indianapolis, Ind., and while Factory Manager J. F. Richman has constructed a number of time and labor saving devices, he has received valuable assistance from the employees, there being a box in his office where the workmen can deposit their suggestions for improving manufacturing. Mr. Richman is never too busy to go thoroughly into an idea entertained by one of his workmen.

Four unique labor and money saving devices are utilized at the Cole plant, these comprising the combination pneumatic body hoist and travelling crane, Fig. 1, the grease cup filler, Fig. 2, the linoleum cutting machine, Fig. 3, and the press, Fig. 4. These are said to be exclusive features in the Cole plant.

Heretofore, from eight to nine men were required to place a seven-passenger body on the chassis in order to mount it safely, and the finish of the body was more or less marred by the operation. The hoist and crane performs this work and only one workman is necessary. Four steel cables with hooks at their lower ends are attached to the body. The hook is made from round steel, shaped like a letter J, and upon its lower portion is a circular steel weight, free to slide, which overhangs the short portion of the hook so that when the weight is dropped down it is impossible for the hook to come out of the top iron to which it is attached. This insures safety when the cables are slack. The operator stands to one

side and by moving a small lever the body is lifted, afterwards pushed forward, the crane permitting the work to be done by a single person. When the body is over the chassis, it is dropped easily and safely by utilizing an air control lever.

Another interesting machine is that employed for filling the grease cups, and four a minute can be supplied by one person. The construction is ingenious and comprises a supply cylinder and two sets of petcocks. The cylinder is shown at the left in the illustration, is made in two pieces, and the upper removable section resembles a bayonet. The grease is placed inside of the longer piece and it is forced by pressure, the air being admitted at the top of the cylinder. The lubricant is forced through the two rows of petcocks into the attached grease cups. The petcocks are utilized to measure the grease, and in the illustration the operator is shown opening the No. 2 petcock in order to fill the cup from the left hand end, supplying the others in order. It is stated that the workman is so proficient in the use of the device that he can tell when a cup is filled by the first bit of material that begins to ooze through the treads at the bottom. The single operator replaces a number of boys formerly utilized in filling the cups by hand, which method not only made for waste, but did not insure the elimination of dirt, or a proper supply.

The fitting of the running boards with linoleum requires considerable skill to prevent the material warping, and if the work is not performed carefully it will detract from the appearance of the car. The Cole practise is to secure this without tacking or the use of metal angle



Fig. No. 2

strips. To prevent warping of the boards, they are made in three pieces, tongued and grooved together, then impregnated with creosote to render the material impervious to water. As a precaution the boards are mounted on four channels with steel step hangers to prevent bending. Then the boards are covered with linoleum, which is secured with a water proof glue. During the setting process the boards are placed in a big press to insure a uniform appearance, as well as perfect adhesion of the material.

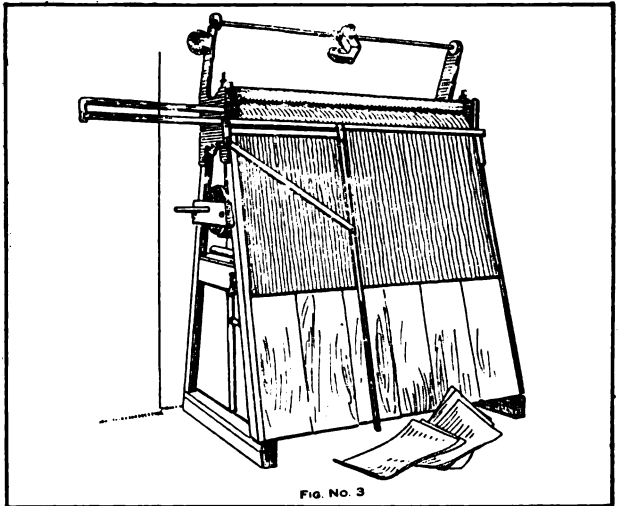
The linoleum comes in rolls six feet long, weighing 350 pounds. Because of the weight and bulk it is difficult to handle and with the old method there was considerable waste in the cutting of the material, difficulty being experienced in measuring correctly. With the device shown



**J. F. Richman, Production Manager
at the Cole Factory.**

at Fig. 3 efficient and economical cutting is assured. Three pulleys are provided, by means of which the roll is lifted into a position well above the floor, protecting it from the injurious effects of moisture and dirt. The loose end of the roll is brought through a pair of lead covered feed rolls at the top of the cutting boards. One of these members is clearly seen just above the linoleum in the illustration. The rolls are operated by a crank at the right, and the material moves down over a cutting board, where it is accurately measured, and vertical cuts made perfectly true. As a result waste has been eliminated, the material is kept clean and when secured to the running boards by the press machine, results in a uniform job, as well as one making for neatness and durability.

Owing to ill health, Manning J. Smith, treasurer of the L. H. Gilmer Company, Philadelphia, Penn., maker of Gilmer endless belts, has been forced to give up his duties, temporarily.



G. Walker Gilmer, Jr., who was formerly connected with the company, will act as sales manager during his absence. John S. Krauss has been elected secretary and factory manager.

The Western Automobile Association, promoter of the Vanderbilt Cup and Grand Prix races at Santa Monica, Cal., has made good its promise to distribute extra prize money for the races if the receipts warranted. Checks have been issued for \$5000 among those in the money in the Vanderbilt Cup and a like sum among the placed drivers in the Grand Prix.

The first use of a cyclecar for the delivery of mail has been made by Earl Stacey of Encanto, Cal., near San Diego, who has taken delivery of an Imp, made by the Imp Cyclecar Company, Auburn, Ind., with which to cover his four-mile route in that section.

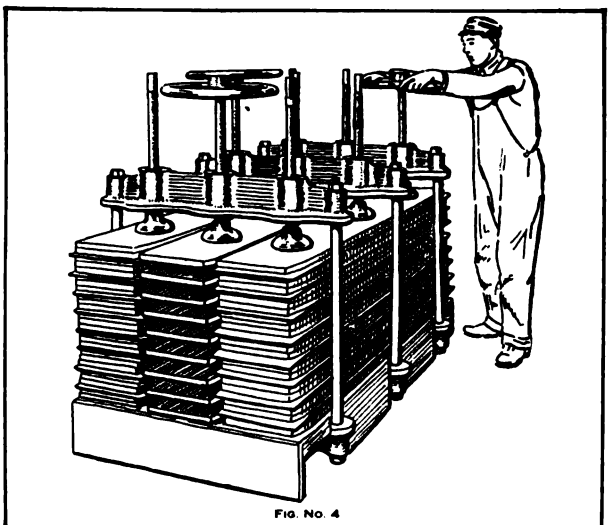


FIG. NO. 4

EQUIPPING THE NEW PRIVATE GARAGE.

Describing Tools and Supplies Needed in the Overhaul and Maintenance of the Car---Devices Economizing in Time and Labor.

HOUSING and maintaining the motor car are problems requiring careful consideration, especially if the owner desires to save the expense incurred by keeping the machine at a public garage and relying upon the expert when minor adjustments or repairs are needed. Numerous instances are noted wherein



Victor Assorted Gaskets.

motorists have reduced the cost of upkeep to the minimum by the home garage, a practise that is gaining many adherents each season through the marketing of moderately priced, portable garages.

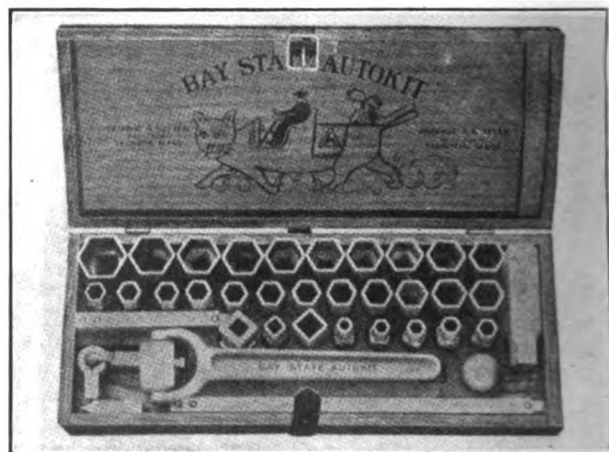
There are several factors to be considered in planning the equipment of the garage. If one is mechanically inclined and is capable of undertaking repairs, and intends to wash and polish the car, the equipment must be more complete than if the machine is simply stored. Some owners attend to minor repairs, wash and polish, and have the more difficult work undertaken by the expert, while others utilize the garage for protecting it from the weather only.

The last named method makes for economy solely, eliminating storage expense, although when the building is on the premises, an additional advantage gained is convenience. A careful study of the subject reveals the fact that the motorist who is capable of accomplishing his own repairs, and utilizes good judgment in purchasing his equipment, can considerably reduce the cost a mile of service for his machine.

A practical working equipment does not necessarily involve a large expenditure of money. Many motorists have, by purchasing tools, supplies, etc., as needed, accumulated a most complete installation, one enabling successful handling of ordinary repairs. When such an equipment is supplemented by the numerous labor and time saving devices now marketed, and, for example, a lathe and a drill press, the outside expense is limited to stock and material.

The age and condition of a car are factors to be taken into consideration when stocking the home garage, for it is obvious that one that has seen much service will require more attention than a modern machine in which the faults of the earlier model have been corrected. The ability of the owner is another factor. Some motorists can complete extensive repairs with an ordinary equipment, while others will require special tools and devices. As it would not be practical for the writer to outline any specific equipment, owing to the varying individual requirements and conditions, the subject will be treated generally, and in selecting material, etc., the owner should bear in mind that a small high grade equipment is to be preferred to a large assortment of inferior articles. This applies particularly to the tools.

Dealing first with the tool equipment: It should include a socket wrench set and, as a complete outfit costs but little more than a small one and generally includes a number of tools



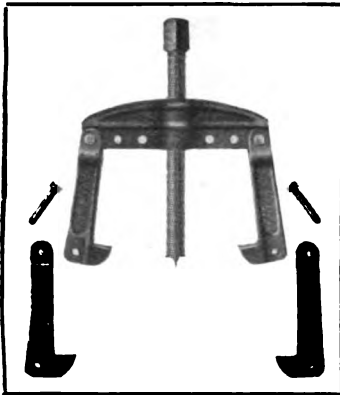
Bay State Autokit, a Practical Wrench Set Eliminating Many Ordinary Tools.



Mossberg Wrench Set.

torists can complete extensive repairs with an ordinary equipment, while others will require special tools and devices. As it would not be practical for the writer to outline any specific equipment, owing to the varying individual requirements and conditions, the subject will be treated generally, and in selecting material, etc., the owner should bear in mind that a small high grade equipment is to be preferred to a large assortment of inferior articles. This applies particularly to the tools.

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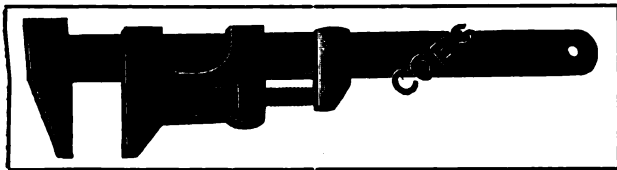


Crane Wheel Puller.

which would otherwise be purchased separately, the extra expense is warranted. Such an equipment, as manufactured by the Frank Mossberg Company, Attleboro, Mass., is shown in an accompanying illustration, and includes in addition to the sockets, open end, offset, ratchet and double

end wrenches, also a pipe wrench, screw driver bits, cotter pin extractor, etc. Not only does such an outfit replace a large number of ordinary tools, but parts not easily accessible with conventional wrenches may be reached with the special members.

The Bay State Autokit, made in several sizes by George A. Cutter, Taunton, Mass., is another practical, complete and inexpensive socket set

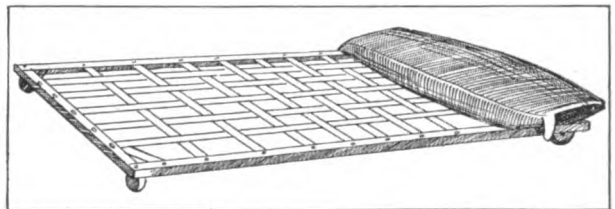


Coes All-Metal Monkey Wrench, a Design Making for Efficiency and Durability.

wrench. Open end and S wrenches are handy and a complete set can be obtained by purchasing single members as needed. A good monkey wrench is most important. The expert repairman utilizes the all-metal member, the Coes, made by the Coes Wrench Company, Worcester, Mass. These come in different sizes and their durability makes for economy. The Stillson wrench is another useful member.

A hacksaw, preferably the adjustable type,

with coarse and fine blades, is a necessary tool, as are pliers. The last named should comprise at least two, ordinary members and a pair having good, strong cutting jaws. Cape, diamond and round nose, and ordinary chisels are not expensive, nor are centre punches and drifts. Poor files are dear at any price and one cannot be too careful in purchasing these. A good machinist's hammer, or two of these, will suffice for all ordinary work, but for driving out threaded parts, etc., a lead, copper or rawhide hammer is required. These, supplemented with one or more



An Auto Tray or Creeper is Handy When the Garage is Not Equipped with a Pit.

substantial screw drivers, a vise having at least a 3.5-inch opening, a breast drill and a fair assortment of drills, steel rule, calipers and clamps, will enable one to complete ordinary repair work.

The work bench can be made or purchased. The marketed type will save time and has many conveniences. A practical motor stand may be constructed from ordinary piping or wood, but those marketed permit of turning over the motor without removing it from the stand.

During the last year or so a large number of time and labor saving electrically operated tools have made their appearance on the market. These include drills, valve grinders, grinders, polishers, etc., and lighten the work wonderfully. Several concerns make a specialty of manufacturing machinery operated by an electric motor and, as electricity is invariably utilized for lighting the garage, it can be employed to operate the lathe, drill press, etc. A drop light with bulb protected by a cage, should be included in the lighting plan. They make for safety.



Practical Tire Gauge, Dover Funnel, Dover Waste Can, Carbon Scraper, Quick Acting Vise and Baby Torch.

TOOLS, MACHINERY, SMALL PARTS AND SUPPLIES.

Supplies, such as cotter pins, lock washers, cap screws, hex nuts, taper pins, tape, wire, soldering iron and torch, waste, graphite, valve grinding compound, shellac, prussian blue, etc., can be obtained as needed.



Dover Gasoline Funnel.

The valve lifter is not an expensive tool and choice is given of a wide variety of designs. Carbon scrapers permit of displacing foreign elements without removing the cylinders with some types of motors, and if the bearings require refitting bearing scrapers will be necessary. When the motor is to be taken out of the chassis, a falls and tackle or chain hoist will be required, and the device will be useful in removing and replacing the body.

In the overhaul of the rear axle and examination of brakes, if the wheel cannot be removed easily a wheel puller will be required. A practical design is the Crane, made by the Crane Puller Company, Arlington, Mass. As will be noted by



Dover Saval Funnel and Soap Economizer.

removing flywheels, gears and similar parts.

Formerly, gaskets were cut by hand, and while with some motors this practise is neces-

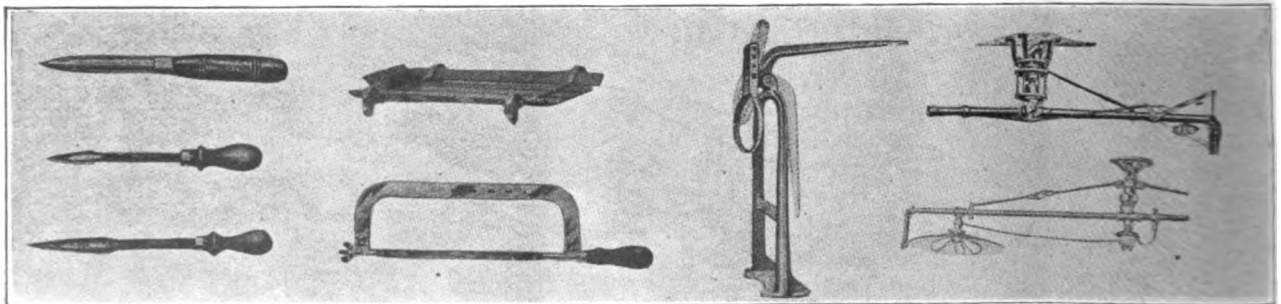
sary, ready made members can now be obtained at a slight cost. The Victor Manufacturing & Gasket Company, Troy and 21st streets, Chicago, maker of copper asbestos gaskets, now produces them in assorted sizes packed in neat boxes, including an assortment of the most popular and universally used members. If an owner desires to make gaskets of special material or size, a gasket cutter that will cut ovals or circles may be secured at a moderate cost.

If the garage is not equipped with a pit, a tray with castors permits of moving in and out beneath the chassis and also prevents the clothes coming in contact with the floor. Some types come equipped with head rests and the majority are not expensive. The above list may be supplemented by a number of useful tools and devices, but those mentioned will suffice for a thorough overhaul of the car, relying upon the machinist for work requiring machinery or accuracy.



Dover Fuel Measure.

The equipment essential for the proper upkeep of the machine—that is, for its operation—will include lubricants, fuel, polish, soap, waste and chamois. Assuming that the owner is to wash and polish his own car, considerable time and labor will be saved by the installation of an overhead washer. Several designs are shown in accompanying illustrations and they permit of moving around the machine easily, as well as eliminate waste of water. Some designs include lighting means, a cluster of lamps being mounted on the washer. If the washing is done by means of an ordinary hose, a light stand will be useful.



Types of Bearing Scrapers, Creeper, Adjustable Hacksaw Frame, Tire Jack and Overhead Washers.

WASHING EQUIPMENT, TURNTABLES AND FUNNELS.

The maintenance of the car will require what may be termed standard equipment, such as fuel and oil funnels, etc. These are not expensive, but only serviceable members should be purchased.

During the overhaul, considerable oily and greasy waste will accumulate and it should not be left on the floor or work bench, as it is susceptible to spontaneous combustion. The only safe receptacle is a metal can, as it is a positive safeguard against fires. The design shown is made by the Dover Stamping & Manufacturing Company, Cambridge, Mass., and is equipped with a self-closing spring cover, a construction insuring that the container is always kept closed.



Perfect Overhead Washer.

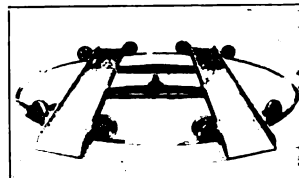
material. They are sturdily constructed.

A good fuel funnel or measure is an absolute necessity and irrespective of the type purchased it should be fitted with a practical strainer, one that will prevent water or foreign elements reaching the gasoline tank. There is a wide variety offered and several designs are shown in the accompanying illustrations. The Dover company markets all types and its No. 55 garage funnel is a practical construction in that it has ample capacity and means for straining the fuel. The strainer is cone shaped, providing a larger surface, and the screen is 100 mesh brass wire. It is removable, as is the spout, and chamois can be used if desired.

The Dover Simplex is another design and is made in two and five-gallon capacities. It is a

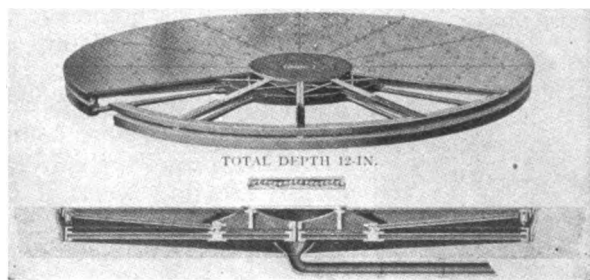
pouring measure, has a funnel attachment on one side and a large special lip for fast pouring on the other. A bail and a handle make for convenience.

Chas. E. Miller, 97-103 Reade street, New York City, markets the No-Shammy funnel shown in an accompanying illustration. This design permits of fast pouring and separates water from the fuel by a novel construction.



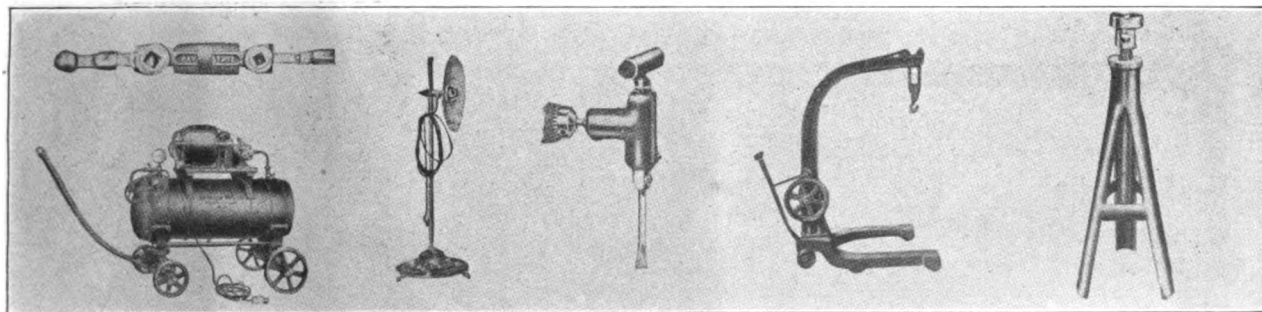
Pitless Auto Turntable.

A good oil measure makes for economy and cleanliness, also saves time and labor. While the ordinary members may be utilized, the Dover Saval permits the motorist to control the flow of the lubricant, thereby preventing waste, as well as the oil spilling over the motor, etc. The Saval has a brass ball valve in the spout and is controlled by a plunger member convenient to the handle. The design permits of pouring oil in cramped positions and where it would be impossible to withdraw the funnel quick enough to



Universal Turntable, Product of Canton Foundry & Machine Company.

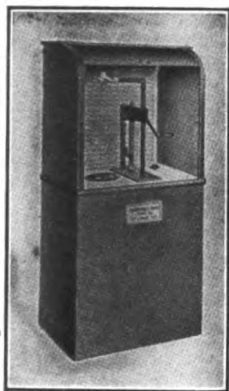
prevent overflow. It is made in one, two and four-quart capacities and of heavy stock, copper plated. These designs make for convenience.



Bay State Sticket Wrench, Brunner Compressor, Electric Valve Grinder, Canton Crane and Morgan Garage Jack.

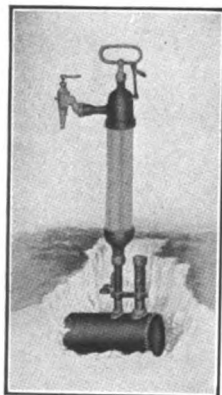
FUEL AND OIL STORAGE SYSTEMS, PUMPS, COM-

Economy can be effected in the grease and oil gun equipment by purchasing a combination unit, although some motorists prefer two or more for handling light and heavy lubricants. The combination unit when equipped with a variety of tips provides a practical gun, and one of this type is the B Line, manufactured by the Randall-Faichney Company, Boston. The Cox Brass Manufacturing Company, Albany, N. Y., also markets a variety of grease and oil guns to meet all requirements of motor car lubrication.



Texas Oil Tank.

The storage of the cylinder oil is a problem that should receive careful consideration. The practise of utilizing a five-gallon can and leaving the measure or funnel beside it on the garage floor is indulged in by many owners. In the first place purchasing lubricant in small quantities does not make for economy, and exposing the measures to dust and dirt means that a rapid cutting abrasive is introduced into the lubrication system and motor, creating wear of the working parts. The can on the floor method also means waste, as frequently the lubricant is spilled in filling the measure.



Texas Fuel Pump.

An oil cabinet or tank eliminates these undesirable factors and choice is given of a large number of designs. That shown in an accom-

panying illustration is the product of the Texas Company, 146 Summer street, Boston, and its advantages are obvious. This concern produces a variety of storage systems to meet individual requirements. Chas. E. Miller also markets an oil tank which comes supplied with three measures and one funnel. The advantages of these designs are that they permit of handling oil in large quantities, filling the measure without waste, and prevent foreign elements mingling with the lubricant.

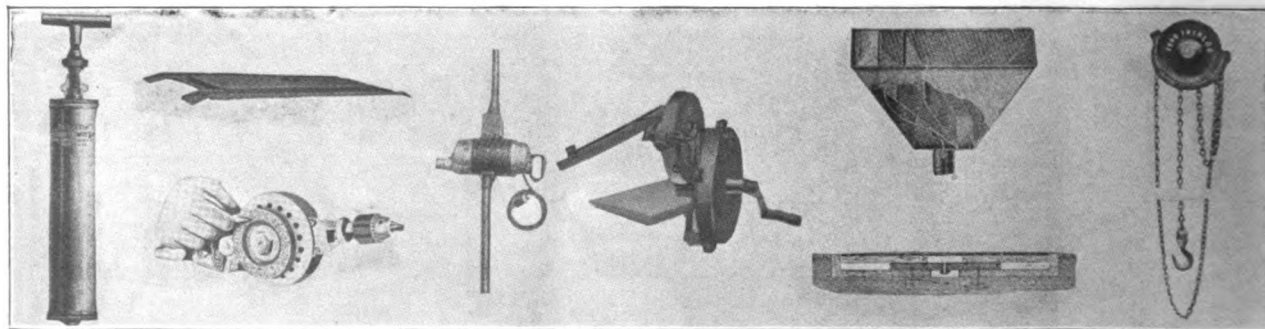
When the fuel is purchased in quantity, one or more barrel lots, economy will not be effected unless the container prevents waste by evaporation or in handling the fluid.



Scaife Fuel Storage System.

The problem of storing and handling gasoline has been given serious consideration by the manufacturers of such equipment and today it is possible to obtain a practical, moderately priced outfit, one that can be locked to prevent use by others than those intended.

There is another factor to be considered in storing gasoline and that is the effect the method will have upon the insurance. Today it must conform with the regulations of the National Board of Fire Underwriters. The underground



B Line Grease Gun, Turntable, Temco Drill and Grinder, Emery Wheel, No-Shammy Funnel, Turntable and Tri-bloc Hoist.

PRESSORS AND GENERAL ELECTRICAL EQUIPMENT.

tank is the safest and most practical installation, as by it the supply can be renewed by the tank wagon without unlocking the garage. The pipe line generally leads into the garage, where it is equipped with a pump for drawing the fuel. There is a wide variety of pumps, some being plain members, while others provide registering and measuring means and locking devices. Some makers include a coil of hose and faucet, enabling the fuel tank of the car to be filled direct, and eliminating the use of a measure and a funnel. With all, provision is made for filtering the fuel, insuring clean gasoline.



Pyrene.

As previously stated, the fuel storage equipment can be obtained with tanks of varying capacities and prices. Two designs are shown herewith, one made by William B. Scaife & Sons Company, Pittsburg, Penn., and the other by the Texas Company of Boston. Both are the underground system and are made in different capacities.

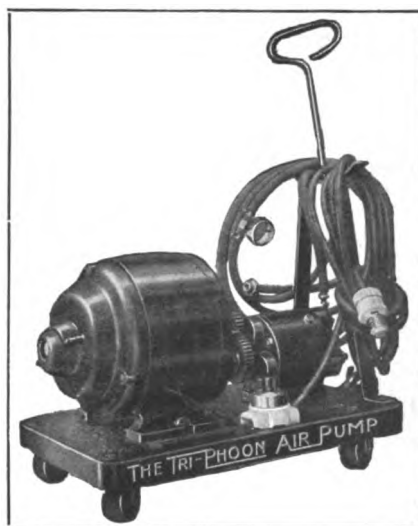
In connection with the home garage should be mentioned the fire extinguisher. One or more of these members should be included in the equipment. With a fire extinguisher it is possible to put out incipient fires that might develop into serious affairs. Among the types marketed is the well known Pyrene, made by the Pyrene Manufacturing Company, 1358 Broadway, New York City, and for which the Pyrene Company of New England, 176 Federal street, Boston, is New England distributor. The tank holds a combination of purely organic materials, containing neither acid, alkali, salts or moisture. Operation is by a double acting pump, throwing a continuous stream to a distance of 30 feet. The fire is surrounded by a non-poisonous gas blanket,

which cuts off the air supply, without which combustion cannot take place.

The Northwestern Chemical Company, Marietta, O., markets a dry powder fire extinguisher, termed Fire-Fly, which comes in tubes and is held to be very efficient. Both makes mentioned are designed for service on the machine, as well as the garage.

The electrically operated garage pump eliminates labor and saves time in inflating tires when the car is not equipped with a power driven pump.

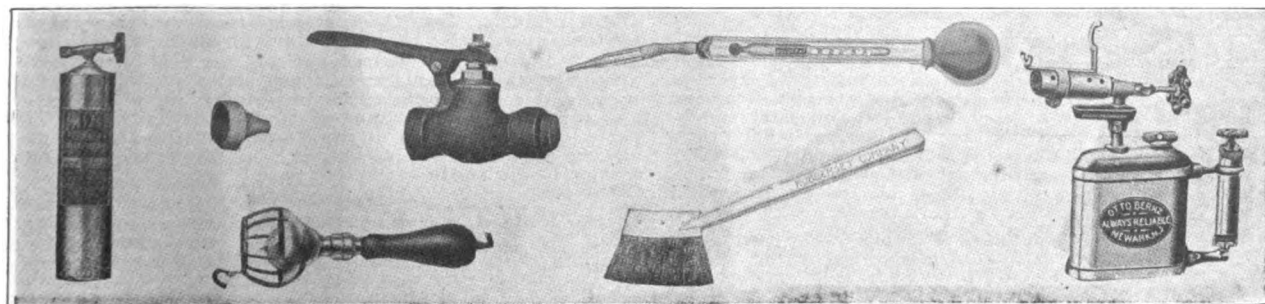
A compact and moderately priced design is the Tri-Phoon, made by the Green & Swett Company, 737 Boylston street, Boston. As will be noted by an accompanying illustration the



Tri-Phoon Garage Pump.

equipment is most convenient and complete.

No attempt has been made to completely list garage equipment, but to present a practical installation which can be supplemented from time to time as needed. The motorist equipping the new home garage, as well as those adding to their equipment, will find many valuable suggestions in the Classified Buyers' Guide, found elsewhere in this issue. All concerns listed will forward data and prices upon application.



J-M Fyro Fire Extinguisher, Water Nozzle, Inspection Lamp, Battery Hydrometer, Washing Brush and Torch.

NEW AND PRACTICAL TOOLS, MACHINERY, EQUIP-

The Dover Stamping & Manufacturing Company, Cambridge, Mass., produces oil and fuel funnels, measures, waste cans, soap pails, bulb cases, drip pans, dust pans, oilers, etc., and a variety of other useful and practical equipment for the garage and the maintenance of the car. These are described and illustrated in the new catalogue issued by the company, which will be of valuable assistance in equipping the new private garage.

The Rub-On Manufacturing Company, 89 Brayton street, Buffalo, N. Y., markets a number of preparations for the motor car, these including restoratives for the top, upholstery, etc.; enamel for the metal parts, top dye and a compound for stopping leaks in the radiator. The company also manufactures the Auto Turn Jack, a very practical device for the garage, in that it practically performs the same work as a turntable. In addition it can be used as a jack. Complete details of the Auto Turn Jack and the line produced by the company will be supplied free upon request.

The Cox Brass Manufacturing Company, Albany, N. Y., in addition to its welding and decarbonizing outfit, markets the Coxajusto shock absorbers, which are not only adjustable to any load, but to any car. Adjustment is obtained by turning a cap at the base of the absorber, it regulating the tension of a helical spring. The company produces a special set for the model T Ford car.

The Perkins Campbell Company, 626 Broadway, Cincinnati, O., is manufacturing an attractive line of specialties for Ford cars, these including the Latigo fan belt, steering gear boots, crank holder, hood strap, license holder, etc. The concern makes a specialty of water proof seat covers, producing these for standard makes of machines, and is prepared to supply them at short notice. The covers, which include top members, are of double, water proof, high grade cloth, made over special patterns, and an accurate fit and high grade material are guaranteed.

The D. Henry Bonner Company, Cambridge, Mass., maker of the Tremo horn, has brought out a special size for the model T Ford car. One of the qualities of the signal is the elimination of the usual coupling, as the attaching means is incorporated with the horn itself, a shank clamping over the exhaust pipe. It is locked by a bolt and nut. The Tremo provides a clear, musical, penetrating sound, and one of its features is that it is as efficient at low motor speeds as at high. It is operated by the exhaust gases and these are not impeded in their flow. The equipment includes the usual linkage, etc., and is moderately priced.

The Alsten & Goulding Company, Worcester, Mass., is making a special offer that will interest motorists in need of tire and tube repairs. The concern will give a discount of 10 per cent. from standard prices up to May 15, and will pay all freight and express charges on out-of-town orders. The company is unusually well equipped to handle all kinds of vulcanizing work and makes a specialty of sectional repairs. The Alsten & Goulding Company is distributor in western and central Massachusetts, New Hampshire and Vermont for all standard lines of motor car accessories.

The Milwaukee Auto Specialty Company, 128 Second street, Milwaukee, Wis., is manufacturing the Centerfire spark plug, which is designed to overcome motor troubles, as well as to operate under abnormal conditions, such as too much oil, etc. The design is such that the gap is protected from oil and carbon deposits. The Centerfire is made in any length and point, and is guaranteed.

The Automatic Appliance Company, 172 Columbus avenue, Boston, has perfected a mechanical motor starter for the model T Ford car, which not only enables the operator to start the motor from the seat, but does not interfere with the use of the regular starting crank. Qualities of the device are an automatic release and an automatic spark retard, preventing injury to the mechanism when starting the engine. One of the features of the Boston starter is that it may be installed easily and without interfering or changing the appearance of the machine, as the equipment, with the exception of the operating handle, is fitted under the hood. The handle is conveniently placed for the driver. It is stated that the leverage obtained is powerful and that a child may turn the motor over easily. Further details and prices are given in a circular which will be mailed free upon request.

The Walte Auto Supply Company, 81 Exchange place, Providence, R. I., is one of the largest exclusive supply and jobbing houses in New England. Its location provides excellent shipping facilities for quick service, and the company carries an unusually large stock, including everything from a cotter pin to a complete garage equipment. The latest catalogue, issued recently, is unusually large and lists in detail the complete line of accessories, supplies and equipment carried by this concern. These include Rayfield carburetors, Mea magnetos, Batavia tires, Success dry cells, garage compressors, Success spark plugs, etc. The new lines carried by this concern include the Halliday Ford shock absorber, Leak-Proof piston rings, Raybestos brake lining, G. B. valve tools, Barrett jacks, Keystone greases, etc. The company makes a specialty of guaranteed service and uses every effort to insure satisfaction in all respects.

Colgate & Co., 199 Fulton street, New York City, is marketing Colgate's Moto-Gloss soap, which is the result of 107 years of soap making and which is stated to be very efficient in removing dirt without injuring the lustre of the varnish. A trial size can will be sent free, also a sample of the Mechanics' soap paste for the hands. Moto-Gloss comes in five, 10 and 25-pound pails, also in half barrels. In writing address department 22.

The Bi-Motor Equipment Company, 180 Massachusetts avenue, Boston, the only exclusively wholesale accessory and supply house in New England, and distributor for the Splitdorf magneto, Rayfield carburetor, Apple Electric Company, and a number of other well known lines, is issuing a new catalogue for dealers only. The book comprises 234 pages, one of the largest ever issued, and it will be mailed to the trade upon application. This company was organized some six years ago and recently remodelled its building to care for its rapidly increasing business. It maintains a large number of men on the road and prompt attention is given to filling orders and making shipments.

F. Shirley Boyd, 903 Boylston street, New England distributor for R. I. V. bearings, the J. H. S. shock absorbers and bumpers, Multibestos, etc., is making a special offer to motorists on the J. H. S. shock absorbers, a trial of 30 days being allowed at the expense of the company. These absorbers are accompanied by a very liberal factory guarantee for one year.

The Motor Parts Company, 185-187 Columbus avenue, Boston, distributor for the Bosch magneto, Zenith carburetor, Leak-Proof piston ring, Kemco fan type generator, Mohawk tires, etc., with branches at Philadelphia and Springfield, Mass., has extended its excellent service by the appointment of distributors in the leading cities of New England, the names and addresses of which are given elsewhere in this issue. Each of the concerns mentioned has a well equipped laboratory for the adjustment and repair of Bosch magnetos, and carries a supply of parts. The other lines of the Motor Parts Company can also be obtained at these houses. Quality, efficiency and service is the motto of the company.

The Platt & Washburn Refining Company, 7 Broadway, New York City, is marketing Veedol, an automobile lubricant, made from the best Pennsylvania crude petroleum, and the result of 30 years' experience with every kind of lubricating oil. The company states it has tested the product, not only by every method known to science, but in actual service under the severest conditions in every standard type of car.

MENT AND SUPPLIES OF INTEREST TO THE MOTORIST.

Chas. E. Miller, 97-103 Reade street, New York City, is issuing a most comprehensive catalogue in which are described and illustrated parts, materials, supplies, accessories, tools, machinery, etc. The books contain hundreds of pages of practical and useful data concerning the overhaul and equipment of a machine, and a postal will bring a free copy. The house of Chas. E. Miller was established in 1896 and it now has branches in the leading cities of the country. Mr. Miller is entirely familiar with the requirements of motorists and the trade.

The Auto Parts Company, Providence, R. I., maker of the well known line of Apco accessories for Ford cars, has brought out a large number of new specialties for this machine, all of which are fully described and illustrated in the new catalogue issued by this concern. The company manufactures a number of parts for the Ford car, such as rings, valves, etc., and all of these are moderately priced, as well as high grade. One of the new accessories is a brake rod support, a very practical device. The catalogue will be mailed free upon request.

The Nicholson File Company, Providence, R. I., an old and established concern, has brought out a file especially adapted for trueing up the points of coils, magnetos, etc. One of the qualities of the tool is that it eliminates waste of the platinum, and another feature is its compact size, making for convenience when smoothing points. The company issues a booklet on files which contains valuable, as well as instructive, data.

The Morgan Manufacturing Company, Newport, R. I., has brought out a new metal polish termed MorganBrite. It comes in popular size containers, and is held to be decidedly efficient in removing tarnish from metal, as well as imparting a high and lasting lustre. The company makes a number of useful and practical specialties, these including the Morgan rolling wedge spring leaf opener, the utility tool, priming cups, carbon scrapers, garage jack, gas lighter, hose clamps, valve lifter, etc. Descriptive matter will be mailed free upon request.

The Bowling Green Sales Company, 82 Flatbush avenue, Brooklyn, N. Y., is marketing Ball carbon remover, which differs from the usual preparations of this kind in that there are no waits, as the tablets do their work while the motor is operating in service. One of the qualities of Ball carbon remover is that it provides lubrication while the carbon deposits are being displaced. The tablets are inexpensive and come in a screw cap box.

The Auto Protector Company, 58 Tyler street, Springfield, Mass., is manufacturing the Clear Ahead lamp bracket, which is made in a special size for the Ford car and a standard design. The device turns the headlights in the same direction as the steering wheel, enabling the driver to make curves with the same degree of safety at night as in the daytime. The device is not only moderately priced, but requires no alterations of the machine to install it.

The Monarch Manufacturing Company, 213 North Main street, Dayton, O., specializes in welding and decarbonizing equipments, which permit of removing carbon deposits from the motor without disassembling the engine, as well as making repairs of broken parts. The company issues descriptive matter explaining fully the advantages and operation of its outfits and will mail it free upon request.

The Headlight Support Company, 1212 Dime Bank building, Detroit, is manufacturing Turning Headlights for the model T Ford car, and one of the qualities of the design is that they may be quickly and easily attached. As the name implies, the device actuates the headlights so that they automatically follow the slightest movement of the steering wheel, thereby throwing the light where it is most needed. When rounding a curve the rays are so projected that the inner portion, as well as the cen-

tre, of the road, is illuminated, making for safety. The company also markets Gasolock, a device for locking the fuel system.

The Frank Mossberg Company, Attleboro, Mass., produces a wide variety of tools useful in the overhaul and maintenance of the motor car. The concern specializes in socket wrench sets, the feature of which is the Mossberg ratchet wrench. These sets are produced in varying sizes to meet requirements, and among them is the special for the Ford car, which contains sockets adapted to reach every nut, bolt, etc., of the machine. The company produces a number of special tools for the Ford car and its catalogue of nearly 200 pages describes and illustrates these.

The Harding Specialties Company, 755 Boylston street, Boston, maker of the Boston tail light detector, a dash device for warning the driver when the tail light becomes extinguished, has brought out a new and practical tool for the garage. It is the Little Giant magnetic lift, which comprises a powerful magnet, a searchlight and a flexible cable. With it tools, nuts, parts, etc., can be removed from places not accessible by the hands. The Little Giant is inexpensive and will save considerable time and labor in recovering parts as above described.

The Frank Miller Company, 351 West 26th street, New York City, is marketing a water proof dressing for leather tops, cushions, seats, upholstery, straps, etc., which is not only inexpensive, but is held to make an old top, or other similar equipment, look like new. The preparation restores the life of the material, and is especially adapted to tops that have become hardened and lustreless. The company also markets a mohair top dressing which is compounded for pantosote and similar materials. It imparts a new velvety finish without hardening the surface.

The Sebastian Lathe Company, 125 Culvert street, Cincinnati, O., specializes in high grade engine lathes, tools and attachments for the same, and produces a number especially adapted for automobile work. The designs are modern and practical in every particular, and the best of material and workmanship is incorporated. The catalogue issued by the company will be mailed free upon request, and contains complete descriptions, as well as illustrations.

The Prest-O-Lite Company, Inc., 226 Speedway avenue, Indianapolis, Ind., maker of the well known Prest-O-Lite gas tanks, is issuing some interesting data on lighting the automobile, which will be mailed free. The company is manufacturing a system for lighting, controlling and extinguishing the lights from the seat, which will appeal to owners whose machines are equipped with acetylene.

The Valentine Company, 456 Fourth avenue, New York City, one of the oldest and best known manufacturers of varnish, is issuing an interesting booklet on "The Care of the Car". It tells how to keep the car new, and as the expense of painting and varnishing a machine is an important factor in its upkeep, the information imparted should be read by every motorist. The booklet will be mailed free upon request.

The Salvador Motor Company, 126 Massachusetts avenue, Boston, Mass., has an interesting proposition for dealers in unassigned territory, respecting its Salvador cyclecar, the dimensions of which place it in the light car division. The machine is said to have been designed by G. B. Mansur, formerly with the De Dion-Bouton Company, Paris, and to incorporate a number of foreign features which have been adapted to meet the requirements of American road conditions. It is pointed out that it is necessary to make application early, as the output for the present year is rapidly being allotted.

NEWS OF THE MANUFACTURER AND DEALER.

The following concerns have been incorporated recently to manufacture or deal in motor vehicles, accessories, etc.:

Van Curve Light Company, Green Island, N. Y.; \$10,000; W. H. Rabbett, T. E. Vanderwerken, R. Caldwell, R. T. Fleming.

Milwaukee Cyclecar Company, Milwaukee, Wis.; \$25,000; to manufacture cyclecars; Charles J. Elgel, Stanley Elgel, Samuel P. Carroll.

Wisconsin Cyclecar Company, Milwaukee, Wis.; \$25,000; to deal in cyclecars; W. B. Christie, W. H. Schwab, W. Fernekes.

Fisk & Dunham Rubber Company, Trenton, N. J.; \$50,000; to manufacture rubber goods; C. F. Fisk, R. C. Dunham, A. A. Taylor.

Conklin-Spindler Auto Company, Chicago, Ill.; \$2000; to deal in automobiles, etc.; Alva L. Spindler, Maurice Kohn, Charles E. Conklin.

Clark Auto Company, Minneapolis, Minn.; \$25,000; to operate a garage and deal in automobiles; Frank C. Clark, Clem Bofferding, John A. Cronholm.

Union Sales Association, Terre Haute, Ind.; \$5000; to deal in machinery, automobiles, etc.; J. R. Finkelstein, G. C. Buntin, H. D. Hughes.

Israel & Stanke Auto Renting Company, New York City; \$3000; Norman Israel, Blanche Israel, Robert A. Stanke.

Tire Supply Association, Minneapolis, Minn.; \$50,000; to deal in tires and automobile accessories; M. J. Rosenstein, L. S. Rosenstein, A. W. Juster, Lewis Rosenthal.

Motor Car Service Station, Rochester, N. Y.; \$1000; to deal in motor car accessories, etc.; William D. Elliott, Joseph K. Elliott, William R. Gilman.

Yale Motor Car Company, Minneapolis, Minn.; \$20,000; to deal in motor cars and conduct a general garage and repair business; N. F. Oslin, R. L. Oslin, Hawkin Oslin, G. A. Nelson.

Cleveland Coil & Manufacturing Company, Cleveland, O.; \$10,000; to manufacture dynamo and motor coils; H. L. Carleton, Owen N. Wilcox, Charles A. Norris, George W. Bach, George A. Shively.

Motor Finance Company, Ltd., Montreal, Can.; \$50,000; to manufacture motor vehicles, engines, etc.; Adolphe Kornbloom, Edwin N. Todd, Edwin A. Mumford and others.

Engel Crude Oil Engine Company, New York City; \$15,000; Henry Engel, Winifred L. Smith, John M. Mumford.

Hoboken & North Hudson Auto 'Bus Transportation Company, Hoboken, N. J.; \$125,000; to conduct a general motor transfer, express and transportation business; W. O'Neill, W. A. Kavanagh, E. F. Martin.

Empire Axle Company, Dunkirk, N. Y.; \$20,000; to manufacture automobile axles, accessories, etc.; Otto F. Hakes, Zella R. Hakes, E. DeHaven.

Back Bay Auto Supply Company, Boston, Mass.; \$2500; William E. Soule, Irving F. Carpenter.

Cooper Manufacturing Company, Ware, Mass.; \$10,000; to manufacture automobile appliances; Julian J. Cooper, Kathryn M. Cooper, Clarence E. Tupper.

Motor Cleaning Company, Rochester, N. Y.; \$50,000; to conduct an automobile business; H. D. Carlton, G. D. Forsythe, M. F. Clark.

The Motor Tire Reconstruction Company, Jersey City, N. J.; \$250,000; to manufacture rubber tires, etc.; C. N. King, G. H. Russell, W. L. Steck.

City Garage of Hartford, Hartford, Conn.; \$10,000; to conduct a garage; R. Elmer Curtiss, John W. Morrison, George W. Dean.

Bord's Garage, New York City; \$10,000; to conduct a garage; John H. Bord.

Northwest Motor Company, Seattle, Wash.; \$25,000; G. H. Tilton.

Erle-Penn Auto Company, Pittsburg, Penn.; \$25,000; John Z. Miller, S. Farmer, R. J. Farmer.

Six-in-One Electric Battery Company, Detroit, Mich.; \$20,000; Lamott W. Little, B. A. Bullock, Seth J. Wicker.

Borden Motor 'Bus Company, Chicago, Ill.; \$2500; Edward N. Dancona, A. J. Pfau, Edwin B. Mayer.

Combustion Engineering Company, New York City; \$100,000; to manufacture heating devices; R. C. Peabody, C. E. Carnard.

National Tire Company, Trenton, N. J.; to manufac-

ture automobile tires; Arthur R. Calvin, Albert Numbers, E. L. Iring.

Acorn Insulated Wire Company, Brooklyn, N. Y.; \$100,000; to manufacture insulated wire; J. Quittner, J. T. McMahon, W. V. Donovan.

Beeson Non-Skid Tire Band Company, Ltd., Ford, Ont.; \$40,000; to manufacture automobile accessories; B. J. Beeson and others.

Continental Starter Company, Detroit, Mich.; \$20,000; to manufacture compressed air starters; Henry J. Guthard, Nelson A. Bloom, Herbert Thomas.

Globe Rubber Tire Company, Jersey City, N. J.; \$25,000; to manufacture automobile tires; Harry J. Joyce, Joseph P. Hall.

Lincoln Tire & Rubber Company, New York City; \$5000; to deal in automobile tires, etc.; Olaf K. Pacht, David Gross, Jacob Cohen.

Eastern Garage Keeper's Protective Association, New York City; \$5000; Chester S. Walz, Thomas C. Walz, John A. Samborn.

Modern Wheel Company, New Orleans, La.; \$35,000; to manufacture wheels for automobiles; T. Semmes, S. P. Walmsley, Arsene Perillat, Clarence O. Sherill, George Blardone.

The Noble Air Pump Company, Cleveland, O.; \$25,000; to manufacture air pumps of all kinds; Elmer E. Derr, George I. Langman, Thomas S. Dunlap, J. C. Noble, C. H. Truscott.

GARAGE AND DEALER.

Benjamin J. Massell, Atlanta, Ga., will erect an automobile salesroom, three stories high, with mezzanine floor, 21 by 100 feet. It will cost \$10,000.

The Vestal Motor Company, Pittsburg, Penn., will erect a new building on Moorewood avenue.

The R. W. Munser & Sons Company, Minneapolis, Minn., distributor of the Hupmobile cars, will erect a new four-story building at 907 Hennepin avenue at a cost of \$45,000, to be used for automobiles and trucks.

Raoul Garcia, Key West, Fla., has sold a half interest in the Island City garage to W. R. Asche. The firm name has been changed to Garcia & Asche.

The Anderson Automobile Company, Anderson, Ind., has changed its name to the Automobile Sales Company. The company handles the Cole cars.

Abraham Cooper, Syracuse, N. Y., contemplates the erection of a modern garage at 815 South State street, to cost \$17,000.

The South Bend Automobile & Garage Company, South Bend, Ind., has dissolved.

The Portage Motor Car Company, Portage, Wis., has placed Leslie Helms in charge of the repair department at its garage.

The Trade Circular Addressing Company, Chicago, can supply the trade with complete lists of garages, Ford dealers, truck owners and supply houses throughout the country.

James Brophy, Bisbee, Ariz., has purchased the agency heretofore conducted by the Overland Automobile Company, and will build a new garage. Work on the building has started.

The Commercial Garage, New York City, will erect a new modern warehouse on Thompson street at a cost of \$70,000.

The Halsey Automobile Company, St. Louis, Mo., is erecting a large building at 26th and Locust streets.

Nicholas Rommelfanger, Boston, Mass., has established a used electric car department at his service station on Newbury street. He is making a specialty of rebuilding used cars and equipping them with new batteries.

D. L. Love, Atlantic City, N. J., has purchased the Old Postoffice garage on New York avenue and extensive improvements will be made.

Charles W. Harris, Nevada, Ia., has purchased the business of the Nevada Auto Company.

The Sanford Street Garage, Springfield, Mass., has taken over the business of the Morse-Readio Company. The company handles the Velle cars.

The Sutter Garage, Marysville, Cal., has been sold to M. P. Powell of San Francisco.

Eugene Bond, Bonner Springs, Kan., has purchased the garage formerly owned by J. E. Stotts.

Casey & Tutin, Sacramento, Cal., has dissolved partnership. J. S. Casey has taken over the business and changed the firm's name to the Cole Motor Company. The concern is located at 1906 M street.

J. E. Hodge, Pomona, Cal., has purchased the Iowa garage at 105 South Gordon street and will operate same.

Leon Cuyler, Millville, N. J., has taken over the garage on West Main street, formerly occupied by Carl Rockhill.

The Barnes, Ziegelm & Mable Company, Fond du Lac, Wis., conducts an exchange for second hand cars of all makes. The company also does repairing and carries a full line of accessories.

J. J. Henry Mueller, Jr., Newark, N. J., has leased the garage at 340 Central avenue and will conduct an up-to-date automobile business. He handles the Havers car.

Gillette & Cramer, Towanda, Penn., has taken over the new garage on Main street and will operate a repair shop in connection with its automobile showroom.

WITH THE MANUFACTURER.

The Motor Materials Company, New York City, has put on the market a new starting device for Ford cars.

The Miller Rubber Company, Akron, O., has opened a new branch at 429 North Meridian street, in that city, in charge of Messrs. Broering and Ruske, both of whom have had long experience in this field. An accompanying illustration presents the interior of the salesroom. A service station will be maintained as well.

The Emil Grossman Manufacturing Company, Inc., Brooklyn, N. Y., has at the request of the management of the Indianapolis motor speedway, repeated the offer of cash prizes to entrants in the 500-mile race, May 30, as follows: First prize, \$500; second prize, \$250; third prize, \$100. These prizes will be paid providing the drivers finishing in the order named use Red Head spark plugs exclusively in the race.

The Ford Motor Company, Detroit, has secured permission to erect a plant at Pittsburg flush with the street line on Baum boulevard and along Morewood avenue. The building will be 11 stories high and will cost about \$1,000,000. It will be used for an assembly plant. Work has already commenced.

The Clark Engine & Boiler Company, Kalamazoo, Mich., is building a 10-12 horsepower, four-cylinder, water-cooled motor for cyclecars.

The General Motors Truck Company, Pontiac, Mich., has just completed some additions to its equipment. The company has installed a 100,000-gallon reservoir as an added protection against fire. A number of new cement floors have also been put in the factory. The factory force has been largely increased within the past 60 days.

The Liggett Spring & Axle Company, Cleveland, O., has moved its plant to Monongahela, Penn., where the executive offices are now located. J. H. Newhart, who is the treasurer, will also assume the duties of general manager.

The Volute Spring Shock Absorber Company, Mount Vernon, N. Y., is the name of a new concern organized to manufacture a new type of spring absorbing device for motor cars. Among those who are interested in the project are Edward M. Benford, Mark D. Stiles and John G. Rock.

The Dort-Wiley One Lady Top Company, Detroit, held its annual meeting recently and the following officers were elected: President and treasurer, H. W. Wiley; vice president and general manager, Emmis J. Beattie; secretary, Walter Stowers; superintendent of construction, Walter Dort.

The Security Auto Locks Auto Company, New York City, has placed on the market a new device to prevent the theft of automobiles.

The J. F. Cram Automobile Company, Geneva, N. Y., will manufacture motor fire apparatus.

The Splittorf Electrical Company, Newark, N. J., has opened new branches and service stations recently as

follows: Cincinnati, 811 Race street; Dallas, Tex., 462 South Ervay street; Dayton, O., and Toronto, Ont., 469 Yonge street. H. J. Hinley, manager of the long established Detroit, also supervises the branches in Cincinnati and Dayton. E. A. Kelly, Chicago sales manager, has placed E. C. McKinney in charge of the Dallas office, while he is preparing to open a branch in Minneapolis. Minn. O. J. Rohde, who looks after the company's interests in New York, Newark, Philadelphia and Atlanta, also supervises the Toronto branch. In addition, C. O. Dail, for several years associated with the sale of Swinehart tires, has been placed in charge of sales for the western territory with headquarters in Chicago. He takes the place made vacant by Fred Connell, who is now manager of the Apple Electric Company, Dayton, O., recently acquired by the Splittorf concern.

The Packard Motor Car Company of Paris, Paris, France, the foreign branch of the Packard Motor Car Company, Detroit, has established a branch office, service station and rental depot in London, England, at 7 Lower Belgrave street, close to Buckingham Palace road. It will carry a complete supply of parts and provide the same technical attention that characterizes this company's other branch houses.

The Bosch Magneto Company, New York City, has recently added to its already long list the following supply stations: Motor Supply & Tire Company, Akron, O.; Albany Garage Company, Albany, N. Y.; Augusta Garage, Augusta, Me.; Bangor Motor Company, Bangor, Me.; Bath Auto & Gas Engine Company, Bath, Me.; Motor Supply & Tire Company, Cleveland, O.; Troy Automobile Exchange,



Interior of the New Branch Salesroom Recently Opened in Akron, O., by the Miller Rubber Company.

Cohoes, N. Y.; Motor Supply & Tire Company, Columbus, O.; Warren Garage, Elkhart, Ind.; Pearce Street Garage, Gloucester, Mass.; Blair Motor Company, Logan, Utah; Court Motor Car Company, Marietta, O.; George W. Roberts Electric Works, Marysville, Cal.; Minot Auto Company, Minot, N. D.; J. P. Gayle Supply Company, Newport News, Va.; Port Washington Garage, Port Washington, N. Y.; Provo Machine & Foundry Company, Provo, Utah; St. Albans Foundry Garage, St. Albans, Vt.; Jenson Bros. Auto Company, Santa Cruz, Cal.; Gavin-Williams Company, San Diego, Cal.; Troy Automobile Exchange, Troy, N. Y.; Utica Cycle Company, Utica, N. Y.; Morgan & Williams Company, Warren, O.; Brass City Auto Company, Waterbury, Conn.

The Utility Motors Corporation, Chicago, has secured a new factory location at Plymouth, Ind., and the machinery is being removed thereto. The company manufactures automobile engines.

The Motz Tire & Rubber Company, Akron, O., recently established three new distributing stations in the Central West. The Electric Garage, Fort Wayne, Ind., and the South Bend Rubber Company, South Bend, Ind., were added to the company's representation in Indiana. Glet Bros. is now distributor of Motz tires in the territory adjacent to Springfield, Ill.

MERCER USING A TENT.

Demand for Product Makes This Necessary to Relieve Congested Conditions.

As a result of the rapidly increasing demand for Mercer cars, particularly since a machine of this make won the Grand Prize at Santa Monica, Cal., in February, the Mercer Automobile Company, Trenton, N. J., has been forced to adopt somewhat unusual means for relieving congested factory conditions, pending the erection of permanent additions to the plant. It may be stated, in this connection, that several large additions were completed only a few months ago, but these appear to have been outgrown.

In order that work might be permitted to progress without interruption, the company recently purchased a large tent, measuring 90 by 150 feet, from the Robbins circus, which has been wintering in Trenton, and this has been erected within the factory grounds. The tent will be utilized for some of the final operations of chassis assembly.

OPEN NEW COLE PLANT.

Dealers and Owners Invited to Visit the Factory During Memorial Day Race.

The new factory of the Cole Motor Car Company, Indianapolis, Ind., was formally dedicated April 15. This building is held to be one of the most up-to-date and complete manufacturing plants in the United States, and the company is justly proud of it.

In order that all Cole dealers and their friends, and owners of Cole cars, may have abundant opportunity to inspect the new plant, the company has extended an invitation to all such to visit the factory during the week of the international sweepstakes 500-mile race on the Indianapolis motor speedway, Memorial Day.

SPLITDORF ON ANDES TRIP.

Martin's Buick Was Equipped with This Make of Magneto on Historical Journey.

Additional information relative to the recent transcontinental journey of Johnson Martin in a Buick car, from Buenos Aires to Santiago, South America, being the first automobile to cross the Andes, shows that the magneto utilized on this trip was a Splitdorf, made by the Splitdorf Electrical Company, Newark, N. J. The news is contained in the following cablegram from Mr.

Blatchley, in charge of the Splitdorf factory branch in Buenos Aires:

The Buick car with Splitdorf magneto made the trip from Buenos Aires to Mendoza through mud, sand and water without trouble and without changing a spark plug in 94 hours. Good result. We have since received word that they have successfully crossed the Andes, arriving safely at Santiago. Highest altitude reached was 13,000 feet. Everything snow above 11,000 feet. Terribly cold. Crossing Continental Divide never before accomplished.

It may interest you to know what we have done with the EV magnetos. One, we installed on the special Indian racer which we have here; the Indian which has it on anything on wheels in South America. Since we put on the Splitdorf the machine runs better than ever and we are getting quite a lot of business through it. We are winning races continually with this machine; never lose.

COMING EVENTS.

May.

- May 5—S. A. E. electrical equipment division meeting, New York City.
- May 9—Hill Climb, Atlanta, Ga.
- May 12—S. A. E. ball bearing division meeting, New York City.
- May 14—S. A. E. motor testing division meeting, New York City.
- May 20-June 7—International automobile and agricultural show, Warsaw, Poland.
- May 25-26—Targa Florio race, Italy.
- May 30—500-mile race, Indianapolis, Ind.
- May 30—Track meet, New York City.
- May 30—Track races, Providence, R. I.

June.

- June 1—Coupe Florio race, Palermo, Italy.
- June 6-7—Track meet, St. Louis, Mo.
- June 10-11—Isle of Man road race.
- June 17-18—Hill climb, Uniontown, Penn.
- June 23-26—S. A. E. midsummer meeting, Cape May, N. J.
- June 24-26—Meeting National Gas Engine Association, Chicago, Ill.
- June 27—Race meet, Brooklands track, Weybridge, England.
- June 30—Track races, Sioux City, Ia.

July.

- July 1-3—Non-stop run, Chicago-Boston, for Glidden trophy.
- July 3-4—Mid-summer meeting, American Automobile Association, Bretton Woods, N. H.
- July 3-4—Road races, Tacoma, Wash.
- July 4—Track races, Providence, R. I.
- July 4—300-mile race, Sioux City, Ia.
- July 4—Grand Prix, Lyons, France.
- July 17-18—Speedway meet, Seattle, Wash.
- July 25-26—Grand Prix, Belgium.

August.

- Aug. 21-22—Road races, Elgin, Ill.
- Aug. 27—Race meet, Brooklands track, Weybridge, England.

September.

- Sept. 5—Track races, Milwaukee, Wis.
- Sept. 7—Track races, Providence, R. I.
- Sept. 9—Speedway races, Pomona, Cal.
- Sept. 9—Road races, Corona, Cal.
- Sept. 9—Grand Prix, Italy.
- Sept. 14—Track meet, Milwaukee, Wis.
- Sept. 26—Race meet, Brooklands track, Weybridge, England.
- Sept. 26-Oct. 6—Show, Berlin, Germany.

October.

- Oct. 1—Kerosene motor competition, Paris, France.
- Oct. 2-3—Track meet, Oklahoma City, Okla.
- Oct. 2-3—Track meet, Trenton, N. J.
- Oct. 16-26—Automobile Salon, Paris.
- Oct. 17-24—Show, Pittsburg, Penn.
- Oct. 19-26—American road congress, Atlanta, Ga.

November.

- Nov. 6-16—Olympia show, London.
- Nov. 8-11—Track meet, Shreveport, La.

AMES EQUALIZING SPRINGS.

Manufacturer Is Co-Operating with Dealers in Providing for Increased Business.

According to the Clarence N. Peacock Company, 1790 Broadway, New York City, and 5986 Center avenue, Pittsburg, Penn., dealers handling Ames equalizing springs report largely increased sales as the result of revised prices. Another feature which has facilitated business is a specification order blank arranged to be filled out with the width, length, curvature and full information as to the spring suspension of the car to which the shock absorbing equipment is to be fitted. This information enables the maker to forward spacing blocks and longer clips for attachment, exactly right for the model to be equipped.

The Ames equalizing spring is designed to gradually check recoil, just as the chassis spring cushions the down thrust. It is stated that spring makers in various sections of the country are indorsing and taking agencies for the equipment, and that several manufacturers of well known cars have made exhaustive tests, signifying their intention of adopting the Ames as a standard fitting. In the latter case the equalizing spring is being built by the vehicle spring maker, under arrangement with the licensees, and delivered assembled with its springs.

Among the new agencies may be mentioned the Babcock Automobile Spring Company, 187 Oneida street, Milwaukee, Wis., and the Josiah Fowler Company, Ltd., one of the best known spring companies in Canada, which has the exclusive Canadian rights, with headquarters at St. John, N. B.

HOLTZER-CABOT GENERATOR.

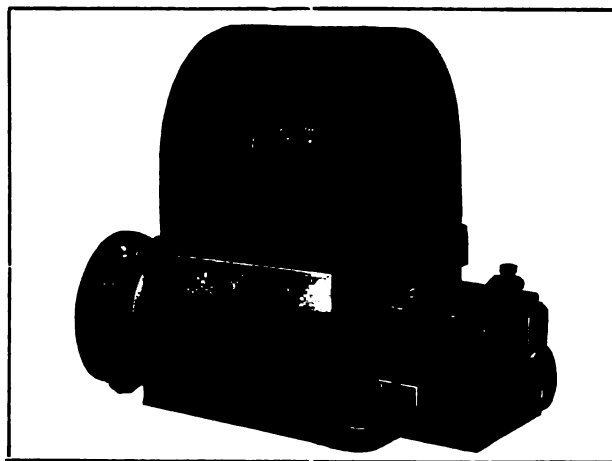
New JS Magneto Is of the Permanent Field Type and Has High Output at 6.5 Volts.

Believing that there is a demand for a moderately priced, high grade generator, one adapted to the used automobile, the Holtzer-Cabot Electric Company, Brookline, Mass., has, after considerable experimentation, brought out what is known as the JS type magneto. It is of the permanent field type, is very compact, and one of its qualities is its output, which is stated to be 5.5 amperes continuously at 6.5 volts—remarkably high for the size of the generator. This efficiency is held to be due to the peculiar form and arrangement of the magnets.

The maker does not claim that the generator is universally applicable to motor car lighting,

but that it will be decidedly satisfactory under the following conditions: For the large car, the owner of which prefers gas headlights, but desires electric side, tail and interior lighting, electric horn and battery ignition for starting; for the complete lighting of cars that are driven chiefly during the day time or where the use of headlights is restricted; for the complete lighting of small automobiles, and for earlier types of large cars without magnetos.

The magneto is equipped with a governor pulley, which prevents excessive armature speeds, and when a storage battery is employed with the system it is connected to the dynamo through a special reverse current cut-out and an ammeter. The last named need not be of an expensive type, as it is utilized to indicate any slipping of the belt, by means of which the generator may be driven, this form being recommended. When the headlights are operated directly from the dynamo the cut-out and ammeter are not necessary, but a form of idler is utilized to release



Holtzer-Cabot JS Type Magneto for Electric Lighting and Battery Charging.

the tension of the belt, as during operation of the car in the day time.

One of the qualities of the cut-out is that it serves as a junction block for the magneto, battery and lighting circuits. The reverse current device permits the battery to take up the ignition and lighting when the motor is slowed down or stopped for any reason, and to allow the charging of the cells when the dynamo attains a predetermined speed. This action is entirely automatic. A six-volt battery may be used with the system, of from 40 to 120 ampere-hour capacity. The new generator is constructed with the same high grade material and workmanship for which the product of this concern is noted, and will appeal to owners desiring a moderate priced lighting equipment.

REVIEW OF 1914 LEGISLATIVE SEASON.

PERHAPS it is not too much to suggest that the recent decisions of the supreme courts in Michigan and Ohio had a decidedly wholesome effect upon the legislatures which have been in session this past few months. Of course, public opinion has helped. Of the 183 bills introduced in the 10 states in which sessions were held this year, but 27 reached the governors, and but 23 were signed. Eight of the legislatures already have adjourned, and it is expected that the other two, Massachusetts and Rhode Island, will adjourn shortly.

Registration Bills.

No drastic or very objectionable measure has been enacted in any state, unless it may be the new registration law in Mississippi. It will be remembered that the supreme court in that state declared the bill passed by a former legislature unconstitutional. The present law is termed a "privilege" tax, and it fixes the rates at which motor vehicles are permitted to use the roads as follows: Motorcycles, \$2.40; electric vehicles, \$4.80; commercial vehicles up to 4400 pounds capacity, \$8.40, and exceeding this capacity, \$16.80; all other motor vehicles, 36 cents a horsepower. The law is somewhat in the nature of an innovation, in that, besides fixing the above rates, it also provides for the registration of motor vehicles, a flat rate of \$2 being required for this purpose, payment of which entitles the owner to a number tag.

Ohio and Kentucky also have new registration laws. The Ohio legislature was called together in extraordinary session for the purpose of enacting a law to take the place of that passed last year and declared unconstitutional by the supreme court. The new rates are practically the same as those in force previous to 1913, and are as follows: Motorcycles, \$2; electric vehicles, \$3; all others, \$5; dealers' licenses, \$20. Chauffeurs must be examined and pay \$1 for registration.

There were 14 bills introduced in Kentucky, some of which were decidedly displeasing to motorists. Only one was passed. This is the new registration law, providing fees as follows: Motorcycles, \$5; cars of 25 horsepower and less, \$6; 25-50, \$11; more than 50, \$20.

Universal Lighting.

Three states enacted universal lighting bills. Of these, Massachusetts already had a law requiring lights on all vehicles, except where street lights were maintained at a distance of 500 feet apart. This exception has now been removed.

Rhode Island also has passed a bill following this latter plan. The new law in New York is patterned more largely after the older Massachusetts statute.

Massachusetts ranked first in number of bills introduced. Of the 48, but four have been enacted as yet. One of these is the light bill mentioned above, another prohibits the use of muffler cut-outs, a third grants additional privileges to non-resident motorists, and the fourth relates to garages in Boston.

Thirty-three bills were introduced in New York, of which three were sent to the governor. Besides the light bill the most important was that placing motorcycles under the provisions of the automobile law, but this was vetoed. The third bill was an act making it a misdemeanor to violate the traffic rules in New York City.

Maryland Speed Limits.

In Maryland, the only important new law regulates the speed of motor vehicles, prohibiting speed exceeding 35 miles an hour. It also limits trucks weighing four to eight tons, with load, to 15 miles an hour, and those weighing eight to 12 tons and traction engines to six miles. It limits widths to 90 inches, gross weight to 14 tons and weight an inch to tire width to 800 pounds.

The administration measure to exempt motor vehicles from personal property tax and increase the registration fees in New Jersey was defeated. The only bill of general interest passed in that state authorizes park boards to limit the speed of motor vehicles and even to exclude them from park drives. A bill authorizing the commissioner of motor vehicles to increase the number of special inspectors to 30 and to appoint men from other state departments upon request, passed both houses, but was not approved.

Local Licenses Permitted.

With the exception of one bill, those enacted in Virginia are local in character. This prohibits driving a truck, tractor or traction engine, fitted with cleats or lugs that will cause injury to the road, over any turnpike that has been treated with bitumen or other binder. One of the others permits local authorities in Accomac, King William and Spottsylvania counties to levy special license taxes to provide funds for construction and maintenance of roads in these mountainous regions. Another prohibits speeding of motor cars between Big Stone Gap and Appalachia in Wise county.

The only bills enacted in South Carolina were

local measures permitting special automobile license in Beaufort and Oconee counties to increase the road fund.

According to the American Automobile Association, which has kept a careful record of the legislative work of the season, the record of bills up to the middle of April was as follows:

	Bills Introduced		Passed	Signed	Vetoed
	Senate	House			
Kentucky	5	9	1	1	..
Maryland	6	16	3	3	..
Massachusetts...	6	42	4	4	..
Mississippi	3	4	2	2	..
New Jersey	9	15	4	3	1
New York	15	18	3	2	1
*Ohio .....	..	..	1	1	..
Rhode Island ..	5	6	3	2	..
South Carolina..	2	5	2	2	..
Virginia	8	8	4	3	1
Totals.....	59	123	27	23	3

*Extraordinary session to consider registration measure.

At that time the Massachusetts and Rhode Island legislatures were still in session. The legislature of Louisiana will convene May 11 and that of Georgia, June 27.

ADOPTS NEW POLICY.

Royal Equipment Company Now Guarantees Raybestos Brake Lining for One Year.

Holding that it is the trend of the times among manufacturers who are producing goods of a high degree of merit to give a consumer a more definite assurance of their durability, the Royal Equipment Company, Bridgeport, Conn., maker of Raybestos, announces as its future policy that this standard brake lining will be sold with a definite guarantee of one year's service. This means that if Raybestos does not give a full year's wear the maker agrees to furnish new lining without charge.

It is held by the company that heretofore no lining has ever been given a definite service guarantee and that at present Raybestos is the only one that is guaranteed. It is suggested that this move is evidence that the quality of this product is constantly being improved, and that the manufacturer is now certain that it has reached a stage of perfection which warrants taking this action.

EXPORTS AND IMPORTS.

Former Practically Hold Their Own for February, While Latter Lose 75 Per Cent.

The report of the bureau of foreign and domestic commerce, Department of Commerce,

Washington, D. C., for the month of February, shows that the exportation of automobiles and parts little more than held its own, when compared with the same month in 1913. Imports fell off practically 75 per cent., however. For the eight months of the fiscal year, exports show a gain of nearly 12 per cent., when parts are included, or a little over seven per cent. in automobiles alone. Imports show a reduction of 60 per cent. over the same period for 1913. The detailed report, as to countries, etc., follows:

EXPORTS.

Country	1913		1914	
	No.	Value	No.	Value
France	41	\$40,222	72	\$49,011
Germany	50	42,605	108	79,600
Italy	24	19,392	16	12,434
United Kingdom	431	359,779	1269	1,017,594
Other Europe	100	91,968	262	193,736
Canada	916	1,086,560	292	861,895
Mexico	38	86,854	9	10,071
West Indies and Bermuda	42	44,367	38	35,854
South America	283	304,630	115	88,244
British Oceania	168	170,771	374	320,195
Asia and other Oceania	199	220,805	199	180,509
Other countries	179	162,144	140	112,812
Totals.....	2471	\$2,630,097	2894	\$2,461,955
Commercial cars	83	\$134,992	57	\$83,461
Passenger cars	2388	2,495,105	2837	2,378,494
Totals.....	2471	\$2,630,097	2894	\$2,461,955
Parts .....	..	444,728	..	612,813
Total exports .....	..	\$3,074,825	..	\$3,074,768

Eight Months of Fiscal Year.

France	418	\$329,410	536	\$410,814
Germany	297	273,640	590	413,144
Italy	192	169,645	211	150,144
United Kingdom.....	2,114	1,627,889	4,781	3,822,919
Other Europe	826	714,510	1,151	906,827
Canada	4,070	4,972,954	2,187	3,021,377
Mexico	231	426,159	133	217,528
West Indies and Bermuda	297	308,224	372	348,599
South America	1,944	2,147,130	1,463	1,500,584
British Oceania	2,037	1,885,099	2,516	2,166,771
Asia and other Oceania	1,332	1,289,242	1,468	1,432,323
Other countries	730	708,726	1,475	1,325,779
Totals.....	14,488	\$14,852,628	16,883	\$15,716,809
Commercial cars	545	\$1,007,367	493	\$797,722
Passenger cars	13,943	13,845,261	16,390	14,919,087
Totals.....	14,488	\$14,852,628	16,883	\$15,716,809
Parts .....	..	2,983,336	..	4,222,301
Total exports .....	..	\$17,835,964	..	\$19,939,110

IMPORTS.

February.				
France	13	\$29,603	4	\$8,829
Germany	9	22,782	..	.....
Italy	5	9,835	..	.....
United Kingdom	4	15,192	2	4,546
Other countries	2	4,707	3	7,200
<hr/>		<hr/>		
Totals.....	33	\$82,119	9	\$20,575

Eight Months of Fiscal Year.

France	290	\$689,027	103	\$257,592
Germany	63	161,291	15	37,307
Italy	84	138,615	39	58,666
United Kingdom	66	187,993	36	110,222
Other countries	66	152,419	37	65,572
Totals.....	569	\$1,329,345	230	\$529,359

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**WE WILL GIVE A DISCOUNT OF 10%
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Pay All Freight or Express Charges on Out of Town Orders.

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Sectional Repairs

2 1/2-inch.....	\$2.50
3-inch.....	\$3.00
3 1/2-inch.....	\$3.50
4-inch.....	\$4.00
4 1/2-inch.....	\$4.50
5-inch.....	\$5.00
5 1/2-inch.....	\$5.50
6-inch.....	\$6.00

Above prices are for 6-inch section. All over 6-inch add 50c an inch to above prices.

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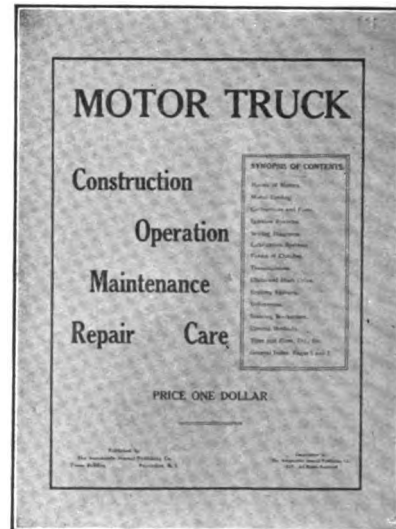
Auto Tube Repair Prices

Under 2-inch.....	50c
From 2 to 6-inch.....	75c
From 6 to 8-inch....	\$1.00
From 8 to 10-inch....	\$1.25
From 10 to 14-inch....	\$1.50
From 16 or over	\$1.75 to \$2.00

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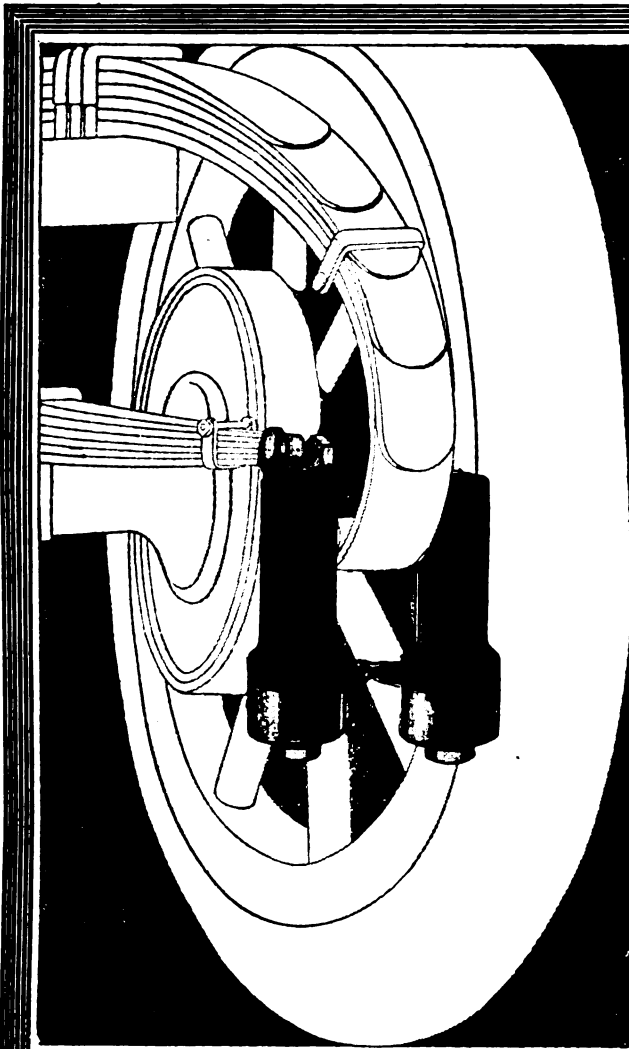
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Danver Accessory Co., 18 Broadway, Pawtucket, R. I. (Daco.)
Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.
Miller, Chas. E., 97-103 Reade St., New York.
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Milwaukee Auto Specialty Co., 128 Second St., Milwaukee, Wis.
Motor Parts Co., 185-187 Columbus Ave., Boston; 818 No. Broad St., Philadelphia; Springfield, Mass.
Northwestern Chemical Co., Marietta, O.
Waite Auto Supply Co., 81 Exchange place, Providence.

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Boyd, F. Shirley, 903 Boylston St., Boston. (R. I. V.)
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Marburg Bros., Inc., 1790 Broadway, New York. (S. R. O.)
New Departure Mfg. Co., Bristol, Conn.
R. I. V. Co., 1771 Broadway, New York. (R. I. V.)

BATTERIES.

Edison Storage Battery Co., 137 Lakeside Ave., Orange, N. J. (Edison.)
Electric Storage Battery Co., Philadelphia. (Exide.)
Geisler Bros. Storage Battery Co., 514 W. 57th St., New York.
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(Continued on Page 104.)

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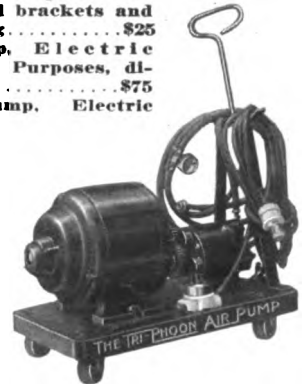
3-Cylinder Air Pump, Electric Driven, for Garage Purposes, direct current\$75

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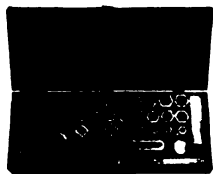
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Empire Automobile Co., Indianapolis, Ind. (Empire, Little Aristocrat.)

Haynes Automobile Co., 166 Main St., Kokomo, Ind. (Haynes.)

Jackson Automobile Co., 1400 Main St., Jackson, Mich. (Jackson.)

Knox Automobile Co., Springfield, Mass. (Knox.)

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Maxwell Motor Co., Inc., Detroit. (Maxwell.)

Metz Company, Waltham, Mass. (Metz.)

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National Motor Vehicle Co., 1033 22nd St., Indianapolis (National.)

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Premier Motor Mfg. Co., Indianapolis, Ind. (Premier.)
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Dart Manufacturing Co., Waterloo, Ia. (Dart.)
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Willys-Overland Co., Toledo, O. (Overland.)

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Couple-Gear Freight-Wheel Co., 575 Buchanan St., Grand Rapids, Mich. (Couple-Gear.)
 Branches: 30th floor, Singer Bldg., New York; 178 Devonshire St., Boston.
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 Branches: See Cars—Gasoline Commercial.
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Carries Extra Bulbs. Safer than in the Lamps of the Car.



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More Economy
More Silence

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(BUYERS' GUIDE—Continued.)

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Northwestern Chemical Co., Marietta, O. (Se-ment-ol Ra-di-ator.)

CHAINS, TIRE, AND ANTI-SKIDDING DEVICES.

Weed Chain Tire Grip Co., 28 Moore St., New York.

CHAINS—TRANSMISSION OR DRIVING.

Boyd, F. Shirley, 903 Boylston St., Boston. (Baldwin.)

Miller, Chas. E., 97-103 Reade St., New York. (Brampton.)

Branches: See Accessory Manufacturers and Jobbers.

COILS.

Helms Electric Co., Lowell, Mass.

CYCLECARS.

Salvador Motor Co., Farragut Bldg., Massachusetts Ave., Boston. (Salvador.)

CYLINDER CLEANING COMPOUND.

Bowling Green Sales Co., 80 Flatbush Ave., Brooklyn, N. Y. (Ball Carbon Remover.)

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.

Milwaukee Auto Specialty Co., 128 Second St., Milwaukee.

Northwestern Chemical Co., Marietta, O. (Carbonox.)

Prest-O-Lite Company, 226 Speedway, Indianapolis. (Prest-O-Carbon Remover.)

Branches: Atlanta, Baltimore, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Indianapolis, Jacksonville, Kansas City, Los Angeles, Milwaukee, Minneapolis, New York, Omaha, Philadelphia, Pittsburgh, Providence, San Francisco, Seattle, St. Louis and St. Paul.

ELECTRIC LIGHTING EQUIPMENT.

Culver-Stearns Mfg. Co., Worcester, Mass.; Detroit.

FIRE EXTINGUISHERS.

Johns-Manville Co., H. W., Madison Ave. and 41st St. New York City.

Northwestern Chemical Co., Marietta, O. (Fire-Fly.)

Pyrene Co. of New England, 176 Federal St., Boston.

FORD AUTOMOBILE EQUIPMENT.

Danver Accessory Co., 18 Broadway, Pawtucket, R. I. (Daco.)

Russell Mfg. Co., Middletown, Conn.

FUNNELS.

Dover Stamping & Manufacturing Co., Cambridge, Mass. (Dover.)

GASKETS AND GASKET CUTTERS.

Shawver Co., Springfield, O.

GEARS, STEERING.

Ross Gear & Tool Co., 794 Heath St., Lafayette, Ind.

GUNS, GREASE. (See Pumps, Oil and Grease.)
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Headlight Support Co., 1217 Dime Bank Bldg., Detroit.

HORNS.

Bouner, D. Henry, Co., Cambridge, Mass. (Tremo.)

Garford Mfg. Co., Elyria, O. (Tuto.)

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

Kent Mfg. Works, Atwater, 4937 Stenton Ave., Wayne Junction, Philadelphia. (Monoplex.)

IGNITION EQUIPMENT.

Kent Mfg. Works, Atwater, 4937 Stenton Ave., Wayne Junction, Philadelphia.

INSULATION.

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

JACKS, ETC.

Shawver Co., Springfield, O.

LAMPS, TAIL. (See Tail Lights.)

LIGHTING SYSTEMS, ELECTRIC.

Garford Mfg. Co., Elyria, O. (Dynalux.)

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

LOCKING DEVICES.

Headlight Support Co., 1217 Dime Bank Bldg., Detroit. (Gasolock.)

LUBRICANTS.

Alsten & Goulding Co., 36 Foster St., Worcester, Mass. (Alding.)

Dixon Crucible Co., Jos., Jersey City, N. J. (Graphite.)

Eagle Oil & Supply Co., 104 Broad St., Boston. (Eagle-line No-Karbon.)

Haws, Geo. A., 148 Front St., New York. (Panhard.)

Branch: 899 Boylston St., Boston.

Indian Refining Co., 17 Battery Place, New York City. (Havoline.)

Miller, Chas. E., 97-103 Reade St., New York. (Pan-American.)

Branches: See Accessory Manufacturers.

New York & New Jersey Lubricant Co., 165 Broadway, New York. (MoToRol, Non-Fluid, Kejex.)

Northwestern Chemical Co., Marietta, O. (Gear-Silence.)

Platt & Washburn Refining Co., 7 Broadway, New York City. (Veedol.)

Standard Oil Co., New York. (Polarine.)

Branches: In all cities.

Vacuum Oil Co., Rochester, N. Y. (Mobiloil.)

Branches: 49 Federal St., Boston; 29 Broadway, New York; Fourth and Chestnut Sts., Philadelphia; 154 Exchange St., Bangor, Me.; 406 Hitchcock Bldg., Springfield, Mass.; 117 Commercial St., Portland, Me.; Fisher Bldg., Chicago; Ford Bldg., Detroit; Indiana Pythian Bldg., Indianapolis.

Valvoline Oil Co., 27 State St., Boston. (Valvoline.)

MAGNETOS AND SUPPLIES.

Bosch Magneto Co., 223-225 W. 46th St., New York.

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Polarine has proven its worth in town and country, ashore and afloat, for every sort of motor.

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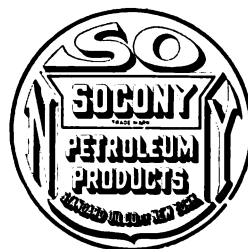
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MOTOR CARS

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GEARLESS TRANSMISSION
SMOOTH—QUIET—POWERFUL
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It's the men behind them that make them leaders of their class. Send for descriptive catalogs.	
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R. E. Olds' famous car—the leading car in its class. The latest model sells at \$1,175, completely equipped, F. O. B. Lansing.—electric starter and electric lights, 35 horsepower.

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Made for Russian Roads
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Elsemann Magneto Co., 225-227 W. 57th St., New York City. (Elsemann.)
Branches: 514 No. Capitol Ave., Indianapolis; 801 Woodward Ave., Detroit.

Heinze Electric Co., Lowell, Mass. (Heco.)

Holtzer-Cabot Co., Brookline, Mass.

Branches: 101 Park Ave., New York City; 6161-65 So. State St., Chicago; 1005 Union Trust Bldg., Baltimore, Md.

Marburg Bros., 1790 Broadway, New York. (Mea.)

Spiltdorf Electrical Co., 98 Warren St., Newark, N. J.
Branches: 10-20 W. 63rd St., New York; 1110 S. Michigan Ave., Chicago; 180-182 Massachusetts Ave., Boston; 1028 Geary St., San Francisco; 972 Woodward Ave., Detroit; 1228 S. Olive St., Los Angeles, Cal.; S. W. Corner Cherry and Juniper Sts., Philadelphia; 1333 Grand Ave., Kansas City; 1628 Broadway, Seattle, Wash.; London, Eng.; Buenos Aires.

MAILING LISTS.

Owners' Auto List Co., Albany, N. Y.

MASTER VIBRATORS.

New York Coll Co., 338 Pearl St., New York City.

MEASURES.

Dover Stamping & Manufacturing Co., Cambridge, Mass. (Auto and Savol.)

METERS, ETC.

Kent Mfg. Works, Atwater, 4937 Stenton Ave., Wayne Junction, Philadelphia. (Kent Pocket.)

Northwestern Chemical Co., Marietta, O. (Hydrometers and Thermometers.)

MOTOR STARTERS.

Automatic Appliance Co., 172 Columbus Ave., Boston. (Boston.)

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.

PACKING, FIRE.

Johns-Manville Co., H. W., Madison Ave. and 41st St. New York City.

PAINT, ANTI-RUST.

Northwestern Chemical Co., Marietta, O. (Never-Rust.)

PISTON RINGS.

McQuay-Norris Mfg. Co., Dept. D, St. Louis, Mo. (Leak-Proof.)

POLISH.

International Metal Polish Co., Quill St. and Belt R. R. Indianapolis, Ind. (Blue Ribbon.)

Johns-Manville Co., H. W., Madison Ave., and 41st St. New York City.

Northwestern Chemical Co., Marietta, O.

PRIMERS.

Duelec Vaporising Primer Co., 14 North Broadway, Yonkers, N. Y. (Duelec Vaporizing.)

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Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.

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Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.
Green & Swett Co., 737 Boylston St., Boston. (Tri-Phoon Car and Garage.)
Shawver Co., Springfield, O.

REAMERS.

Martell Motor Co., 1928 Columbus Ave., Boston. (Martell Aligning.)

RIMS—REMOVABLE AND DETACHABLE.

Boyd, F. Shirley, 903 Boylston St., Boston. (Dorian.)
Chester Demountable Rim Co., Fall River, Mass. (Chester Demountable.)
United States Tire Co., Broadway and 58th St., New York. (Continental and Whittlesey Demountable.)
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RINGS. (See Piston Rings.)

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Perkins Campbell Co., 622 Broadway, Cincinnati, O.

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Cleans off the dirt without injury to the lustre of the varnish.



Costs a trifle more than some soaps—but varnish costs still more.

The experience of 107 years of soap making is behind Moto-Gloss.

Get it of your garage man.

A trial size can of Moto-Gloss sent for 6 cents in stamps—sufficient for 2 or 3 washings of your car. We will include a free trial size of Mechanics' Soap Paste—a hand cleanser which takes the dirt and leaves the skin.

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Dept. 22

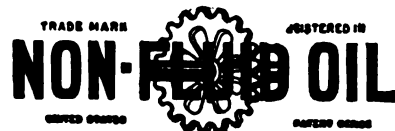
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Economical Lubrication

is not possible when ordinary oils and greases are used. You should exercise as much care and judgment in selecting a lubricant as you do in selecting a car. If such methods are pursued your choice of lubricants will always be



This effective lubricant, which is endorsed and recommended by the majority of motor car manufacturers, produces a film, between the bearing surfaces, which positively will not thin out under the action of frictional heat, and allow them to come together.

Non-Fluid Oil will not gum and harden in cold weather after the manner of ordinary grease.

Non-Fluid Oil is the most economical lubricant for your car.

Packed only in orange enameled cans bearing the above sprocket-wheel trade mark.

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can be bought at the same price? They overcome all Engine troubles, fire where others fail and Add Power to engine. Any length point desired made to order. Try them and you will use them—always. Make a trial and save money. \$1.00 each, 6 for \$5.00.

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ABSOLUTELY
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Install in two hours.

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New England Dealer for

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The car that started the stampede to standardization
A Cole franchise is a valuable asset to any dealer. Find out about it.

Cole Motor Car Co. of Indianapolis



YOU CAN SAVE 15 PER CENT

of your insurance premium every year by installing a Pyrene Fire Extinguisher in a convenient and conspicuous place on the dash-board of your automobile. For further particulars address

PYRENE COMPANY OF NEW ENGLAND
176 Federal Street, Boston, Mass.

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Hoyd, F. Shirley, 903 Boylston St., Boston.
J. M. Shock Absorber Co., 210 So. 17th St., Philadelphia
(J. M.)
Sager Co., J. H., 271 South Ave., Rochester, N. Y. (Peerless.)

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Colgate & Co., 199 Fulton St., New York City. (Moto-Gloss and Mechanics' Soap Paste.)
Northwestern Chemical Co., Marietta, O. (Dermalene.)

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Ailsten & Goulding Co., 36 Foster St., Worcester, Mass.
(Aiding.)
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Branches: See Magnetos and Magneto Supplies.
Heinze Electric Co., Lowell, Mass. (H. E. Co. Priming.)
Johns-Manville Co., H. W., Madison Ave. and 41st St.
New York City.
Mosler, A. R. & Co., P. O. Box M, Mt. Vernon, N. Y. (Split-Fire.)
Silvex Company, The, 60 Wall St., New York City. (Bethlehem Five Point.)
Splitdorf Electrical Co., 98 Warren St., Newark, N. J.
Branches: See Magnetos and Magneto Supplies.

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Johns-Manville Co., H. W., Madison Ave. and 41st St.
New York City.

SPEEDOMETERS, RECORDERS, ETC.

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New York City. (Electric.)
Northwestern Chemical Co., Marietta, O. (Hydrometers and Thermometers.)

SPRINGS FOR AUTOMOBILE SUSPENSION.

Marburg Bros., Inc., 1790 Broadway, New York. (Marburg-Hagen.)

SPROCKETS.

Hoyd, F. Shirley, 903 Boylston St., Boston. (Baldwin.)

STEEL, ETC.

Ward's Sons, E. T., 25 Purchase St., Boston, Mass. (Seamless.)

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TAIL LIGHT DETECTORS.

Harding Specialties Co., Inc., 755 Boylston St., Boston.
(Boston.)

TAIL LIGHTS.

Combination Tail Light Co., 954 Tremont St., Boston.
(Universal Electric.)

TANKS, ACETYLENE GAS.

Prest-O-Lite Company, 226 Speedway, Indianapolis.
(Prest-O-Lite.)
Branches: See Cylinder Cleaning Compound.

TANKS, TIRE INFLATING.

Prest-O-Lite Company, 226 Speedway, Indianapolis.
(Baby Tire Filler, The Emancipator.)
Branches: See Cylinder Cleaning Compound.

TAPE, ASBESTOS.

Johns-Manville Co., H. W., Madison Ave. and 41st St.,
New York City.

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Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y. (Holders.)
Shawver Co., Springfield, O. (Tools.)

TIRE CHAIN GRIPS. (See Chains.)

TIRE PRESERVATIVES AND PROTECTORS.

Northwestern Chemical Co., Marietta, O. (Tire-Lac.)

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Braender Rubber & Tire Co., Rutherford, N. J. (Braender.)
Goodyear Tire & Rubber Co., Madison St., Akron, O. (No-Rim-Cut.)
Branches: In all principal cities.
Mots Tire & Rubber Co., Akron, O.
United States Tire Co., Broadway and 58th St., New York.
(Continental, G & J, Hartford, Morgan & Wright.)
Branches: See Rims—Removable and Detachable.

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They are absolutely gas tight. They have no equal for speed and power. The Plug with the **STONE INSULATOR**. Made to fit *any engine, any thread.*

Guaranteed Forever As to Workmanship and Material

Adopted by leading automobile manufacturers as standard equipment for 1914. Ask your jobber to supply you, or write us direct.

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Thousands of Car Owners All Over the World Are Using Blue Ribbon Goods



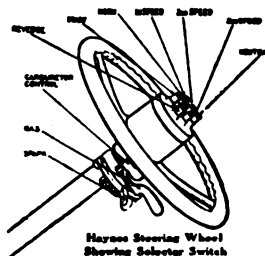
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Haynes Steering Wheel
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Electricity Shifts the Gears on the

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America's First Car

Two "sixes" and a "four". Roadsters, touring and enclosed body cars.

Catalog covering this season's models upon request.

The Haynes Automobile Company
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Do you want to be one of that great army of progressive patriots who are helping to build a greater, more beautiful and more prosperous America?

Do you want to join with a million others, in the pushing through of an unselfish work which means more business, more pleasure and more advantages to all?

Do you want to help in the building of an eternal monument to the greatest name in the history of our country, to the greatest man the nineteenth century produced—Abraham Lincoln?

Do you wish to aid in the completion of the most practical enterprise ever undertaken by the American people? A 3400-mile link connecting the two oceans, to be used by, and directly profiting sixty millions of our population?

If you do, join the Lincoln Highway Association.

It's a great organization—a grand work to feel in sympathy with. Costs but \$5.00, payable once. The price of one good dinner, of one ten-cent cigar a week for a year, makes you a contributor and places your name on that vast list of patriots which generations to come will have cause to bless.

Get out your check book now. Here's a chance for you to build a portion of a lasting monument, the longest improved road in the world.

We have a pair of Lincoln Highway pennants, like the illustration, for your car. They will come to you for a dollar, prepaid.

A big map of the United States, showing the route of the Lincoln Way, is a fine thing to have on the wall of your office. It's backed with cloth, printed in three colors and costs \$2.00.

All the real Lincoln Highway boosters are wearing a little red, white and blue lapel button—they're twenty-five cents. Wear one.



Send the five to
The Lincoln Highway Association
 Dime Bank Building DETROIT, MICHIGAN

THE LINCOLN HIGHWAY ASSOCIATION,
 DETROIT, MICHIGAN.

Gentlemen:

I regard it as a privilege to be one of the many who will make THE LINCOLN HIGHWAY possible, and am accordingly sending along my check for Five Dollars as my subscription to this glorious cause.

NAME

ADDRESS



Check here if you will sell certificates to your friends.

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Goodrich Co., B. F., Akron, O. (Goodrich.)

Polack Tyre and Rubber Co., 246 W. 59th St., New York City. (Polack.)

United States Tire Co., Broadway and 58th St., New York.
 Branches: See Rims—Removable and Detachable.

TOPS AND ATTACHMENTS.

Springfield Metal Body Co., 20 Medford Ave., Springfield, Mass.

TRUCKS AND TRACTORS—(See Cars, Commercial.)

TRUNK RACKS.

Connecticut Steel & Wire Co., Hartford, Conn.

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VALVE LIFTERS.

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VIBRATORS. (See Master Vibrators.)

VOLTMETERS—(See Ammeters.)

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National Motor Car Supply Co., 5604 Euclid Ave., Cleveland. (National Garage Steam and Wizard Automatic.)
 Vanderpool Co., Springfield, O.
 Williams Foundry & Machine Co., Akron, O.

WELDING OUTFITS.

Prest-O-Lite Company, 226 Speedway, Indianapolis. (Prest-O-Welder.)
 Branches: See Cylinder Cleaning Compound.

WRENCHES AND COMBINATION OUTFITS.

Coss Wrench Co., Worcester, Mass.
 Cutter, George A., Taunton, Mass.
 Mossberg Co., Frank, Attleboro, Mass.

Unity of Interest

The owners, the board of directors and the executive officers of the Pierce-Arrow Motor Car Company are one and the same group of men.

This means that the

PIERCE-ARROW

organization is one of united individuality, hampered by no outside interference or syndicated control. It means that the Pierce-Arrow directors are free to utilize their full resources of capital, brains and energy to the attainment of their ideal—the successful building and marketing of the best possible motor trucks and pleasure cars.

Every individual directly interested in Pierce-Arrow financial success is a working unit in the Pierce-Arrow organization.

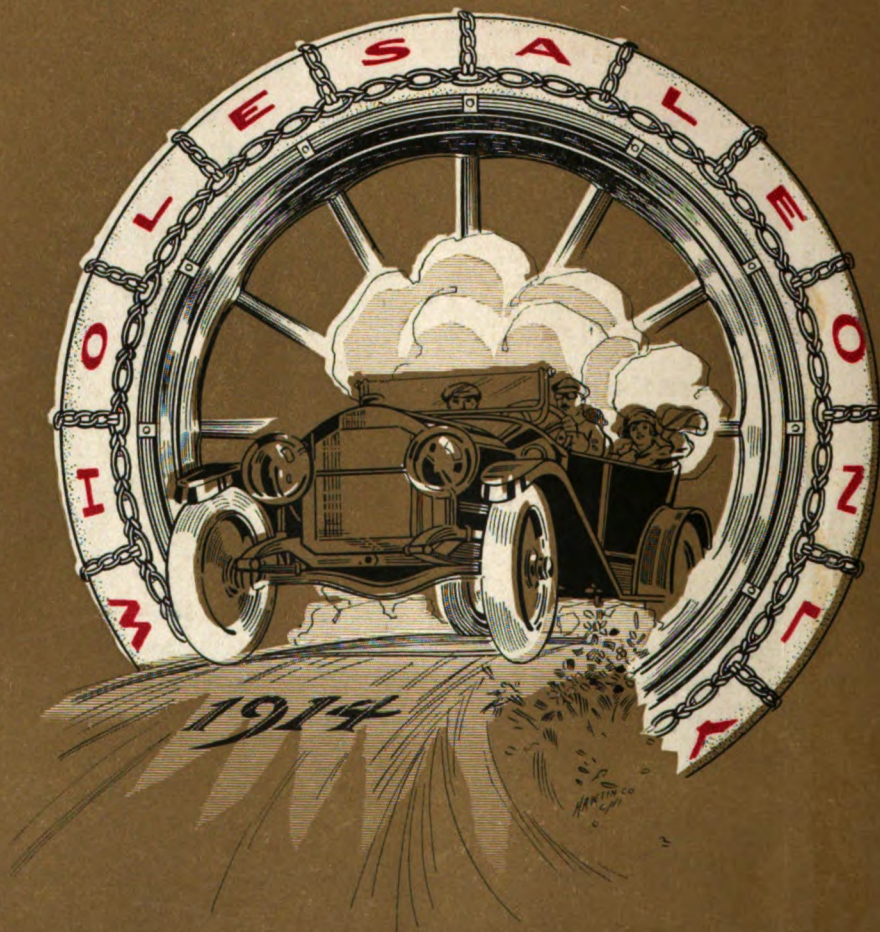
The Pierce-Arrow Motor Car Company of Buffalo, N. Y.

FOR DEALERS ONLY

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BI-MOTOR EQUIPMENT COMPANY



MANUFACTURERS & DISTRIBUTORS

180-182 MASSACHUSETTS
AVENUE
BOSTON, MASS.



Just write "Catalogue Please" on your letterhead and mail to us
today---It is all wrapped up waiting for your name.

"Give me a quart of oil"

This careless request may bring costly penalties

One of the surest ways to invite friction-drag and motor trouble is to say, "Give me a quart of oil."



How to secure the correct oil for your car

Do not say, "Give me a quart of oil."

"GIVE ME A QUART OF OIL" invites Loss of Power

You can get full compression—complete power—only by using oil whose body suits your motor.

Correct body is seldom secured by saying, "Give me a quart of oil."

"GIVE ME A QUART OF OIL" invites Scored Cylinder Walls

Scoring frequently results from oil of low lubricating quality.

Too often the blame can be traced straight to "Give me a quart of oil."

"GIVE ME A QUART OF OIL" invites Wear of Bearings

Bearings differ in type and size.

For every oil that suits your motor bearings, you will find many which will cause undue friction.

An almost sure start toward bearing-trouble is, "Give me a quart of oil."

"GIVE ME A QUART OF OIL" invites Carbon Deposit

Guesswork won't eliminate this trouble.

Suppose the body is too light for the piston clearance. The oil then works too freely into the combustion chambers. In burning, excess carbon accumulates—unless the oil's ash is light and naturally expelled through the exhaust.

An easy road to carbon trouble is, "Give me a quart of oil."

"GIVE ME A QUART OF OIL" increases Maintenance Cost

If the oil's quality is low, more of it is necessary to maintain a film.

If its body is incorrect, you have incomplete protection for moving parts.

In either case excessive friction-drag results. Fewer miles are obtained from each gallon of gasoline. Your fuel and repair bills mount up.

You want an oil whose body is correct and whose quality is best suited to the requirements of your motor.

Ask for that oil and get it.

On request we will send our Chart of Automobile Recommendations.

This Chart was prepared by a company whose authority on scientific lubrication is recognized throughout the world—the Vacuum Oil Company.

It was prepared after a careful analysis of the motor of each make and model of American and foreign car.

Make a note of the grade of Gargoyle Mobiloil specified for your car in this chart. Then make sure that you get it.

In buying Gargoyle Mobiloils, it is safest to purchase in original barrels, half-barrels, and sealed five-gallon or one-gallon cans. Look for the red Gargoyle on the container.

On request we will also mail a pamphlet on the Construction, Operation and Lubrication of Automobile Engines. It describes in detail the common engine troubles and gives their causes and remedies.

The various grades of Gargoyle Mobiloils, purified to remove free carbon, are:

Gargoyle Mobiloil "A"
Gargoyle Mobiloil "B"
Gargoyle Mobiloil "E"
Gargoyle Mobiloil "Arctic"

GARGOYLE

Mobiloils
A grade for each type of motor

They can be secured from all reliable garages, automobile supply houses, hardware stores, and others who supply lubricants.

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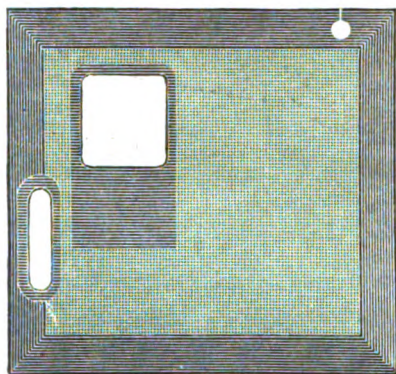
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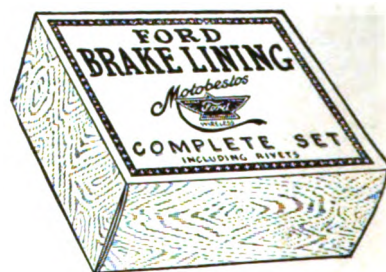


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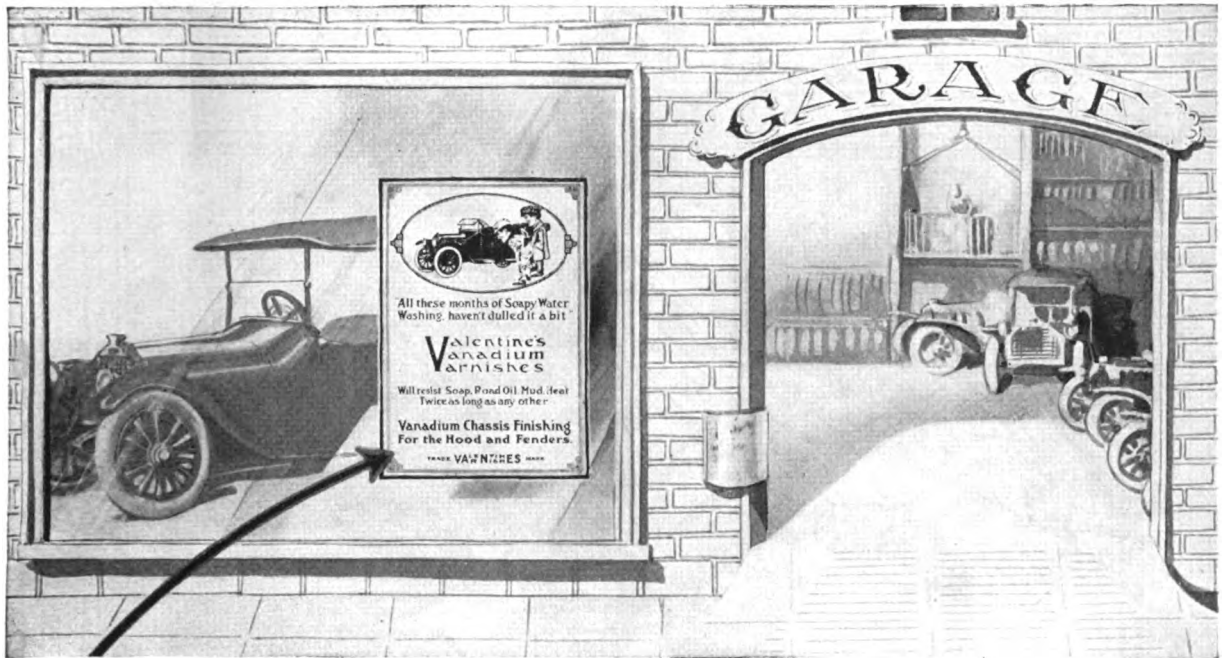
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may demonstrate no better than some lesser cars. It may even look no better. But the chassis is built, in the hidden parts, like no other car in this class. And the results will show in time.

Reo the Fifth is built to endure. It is built for safety, for low cost of upkeep, for long years of perfect service. The man who builds it has for 27 years been learning how to better cars.

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It takes six weeks to build Reo the Fifth. Days are spent on tests and inspections rarely applied to cars. Days are spent to get utter exactness, by grinding and regrinding.

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To get super-strength and freedom from trouble we add about \$200 to the necessary cost of each car.

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And we give you a price \$220 less than last year, with electrical equipment. This is due mainly to the fact that all our special machinery has been charged against previous output.

This car will save the average user hundreds of dollars because of our extra care. And legions of men know this.

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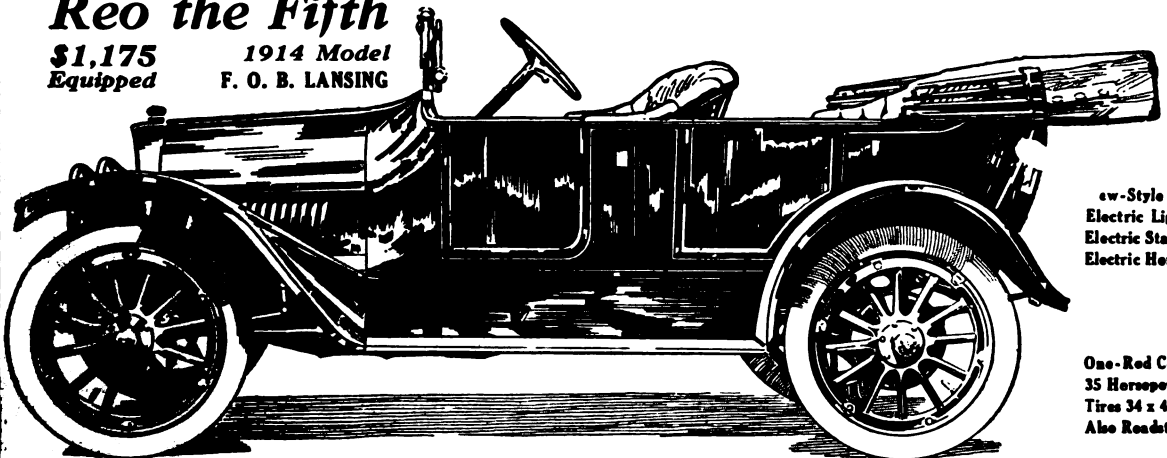
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Overland

A British Critic's Appreciation

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Though English authorities have always fought the "invasion" of the medium-priced American car, Overland worth has now convinced even the most skeptical of these critics. Below we reprint, in part, an article recently published in The London Illustrated News, written by W. Wittal, one of the most able motor authorities of the old world:—

"I have had occasion to become more closely acquainted with one American car—the Overland it is certainly exceedingly fine value for the money.

" . . . It has a big, able engine, three-speed gear box, electric self-starter and lighting equipment, magnificent brakes, most comfortable

and roomy seating accommodations for five, hood, screen, lamps, speedometer, tools—everything complete, in fact, save the petrol to drive away with.

" I found the car to run as well as it looks, which is saying a great deal. Quite fast on the level, silent, with a wonderfully good acceleration, and a fine hill-climber withal, I really do not see what more can be desired by the average motorist than the Overland will give. I am no particular friend of the low-priced American vehicle, *but this Overland car is one which would convert the most determined opponent of the Transatlantic cars.* In my analyses of American cars, I have invariably striven to hold the scales fairly, recognizing merit where merit is present. *And certainly it is present in the Overland and that to a very remarkable degree.*"

The Overland is universally accepted as the leader of its class. It costs 30% less than other cars of like specifications.

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The Willys-Overland Company, Toledo, Ohio

Manufacturers of the famous Overland Delivery Wagons, Garford and Willys-Utility Trucks. Full information on request.

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Electric head, side,
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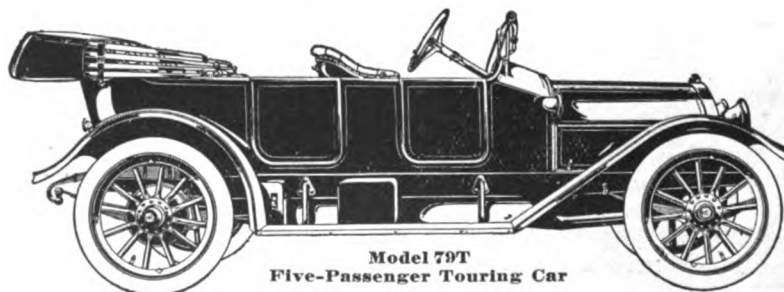
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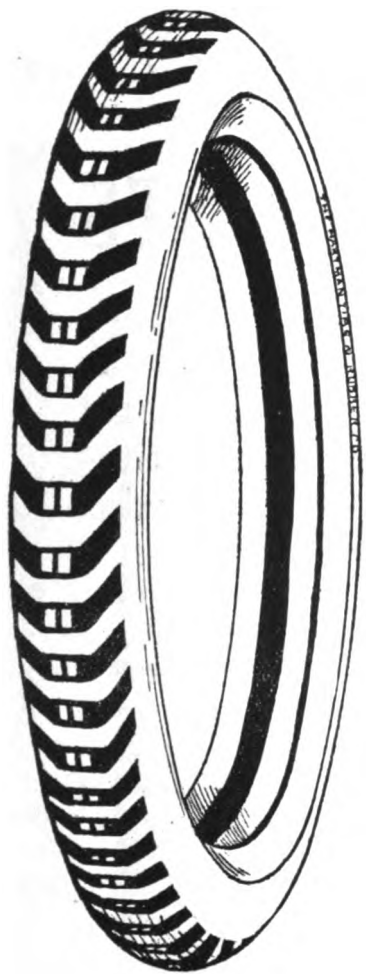
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It's the very latest improvement in the manufacture of pneumatic tires.

THE TIRE IS BUILT AND CURED SIMULTANEOUSLY and the component parts Therefore Must Adhere uniformly.

Whereas, The old style of tire manufacture requires two processes of finishing, virtually the same manner which your repair man uses in recovering old tires, which can never give uniform results.

**If You Are a Progressive Man
You Will Investigate the Hardman Tire**

Don't be skeptical, this is an age of advanced ideas and The Hardman is the most advanced idea in Automobile Tires.

The Process is Right, the Fabric the Best and the Friction Pure and the component parts the results of many years' experience.

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Automobile Journal Publishing Co.

Times Building

Pawtucket, R. I.

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And the saving in gasoline is only a small fraction of the running expense of your car which you will save by using

VEEDOL

Engine troubles, the necessity for grinding valves, repair bills, are mostly due to faulty lubrication. Any manufacturer, or dealer, will tell you so. *And you can't get proper lubrication from a poor oil.*

VEEDOL is made from a base which furnishes the best lubrication in the world—Pennsylvania paraffine petroleum.

It is a highly refined oil, containing no free carbon. Its viscosity under high temperature will maintain a constant film between the working parts of your engine. It burns up the cleanest of any oil in the market.

VEEDOL is a proven, tested oil. Our physical laboratory is probably the most completely equipped in the world. It reproduces exactly the condition of the oil in the actual operation of every type of car. It *eliminates all guess-work*. Our extensive chemical laboratories assure an absolute uniformity in every gallon.

VEEDOL is the final result of study and experiments extending over 30 years, in the endeavor to produce a lubricating oil which would give *the most lubrication with the least carbon deposit*.

It is the most nearly perfect cylinder oil ever put on the market. Ask your dealer for it. If he is not yet supplied with VEEDOL he can quickly get it for you.

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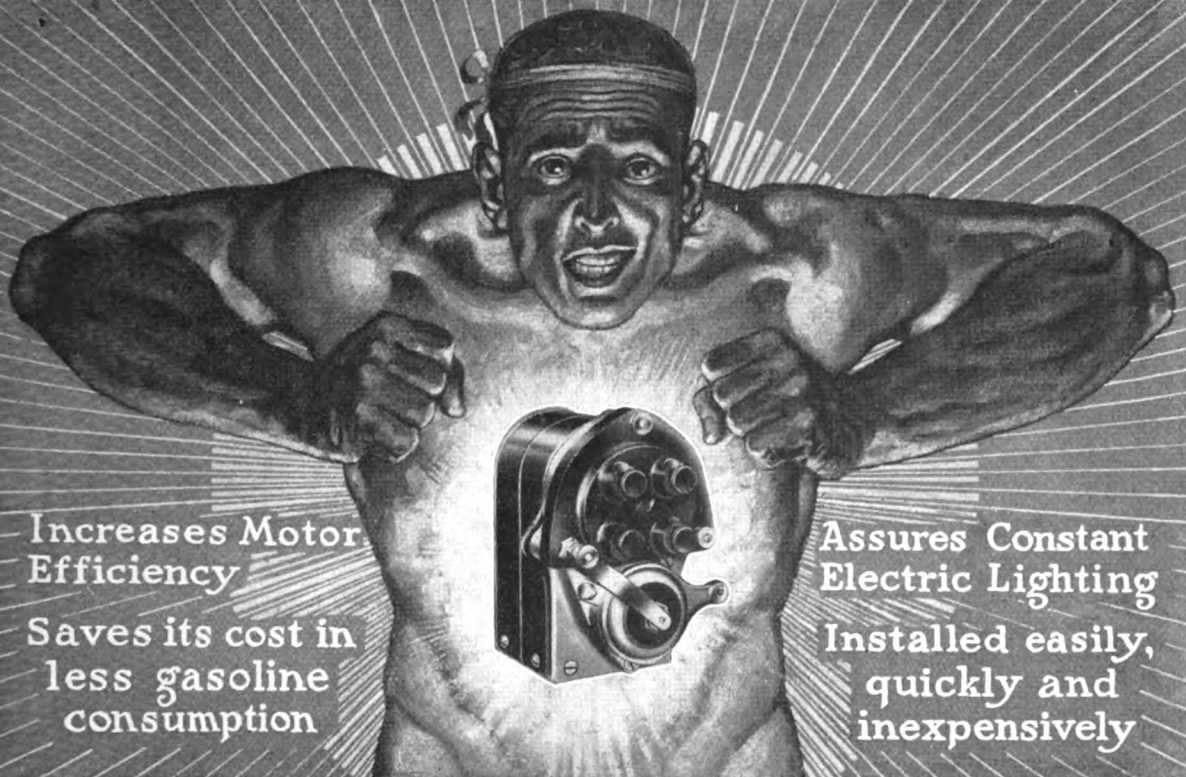
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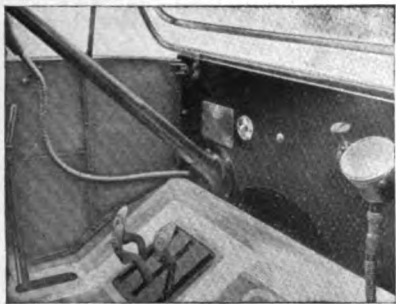
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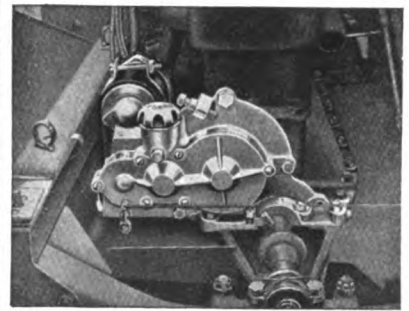
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With its installation the cumbersome coil box gives way to a dainty switch.

"Ford Power Possibilities" is a booklet fully describing the Splitdorf Ford Special High Tension Magneto in detail and its many positive advantages to a Ford machine with illustrated details of installation. Send for it *Today*—it's *Free*.



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Carbon in your cylinders means loss of power. Customers report 100,000 to 150,000 miles with no carbon troubles. A good motto: TRY ANYTHING ONCE. EAGLEINE NO-CARBON AUTO OIL is furnished in 1.5, 10 gallon, 30 and 50 gallon Steel Drums with faucets for which no extra charge is made.

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Dropped 28%

During 1913 No-Rim-Cut tire prices dropped 28 per cent. They dropped so fast, so far, that 16 makers have declined to follow.

Now comes this situation:

Sixteen makes of tires are selling higher than Goodyear prices. Some are nearly one-half higher. Higher, mark you, than No-Rim-Cut tires—the tires which once cost one-fifth more than other standard tires.

The Reason Is— Mammoth Production

The difference lies in quantity. In this new factory with its new equipment we are building up to 10,000 motor tires per day. Perhaps twice as many as the largest rival plant.

Factory cost has dropped immensely as our output multiplied. And every saving goes to you. Last year our profit averaged only 6 1-2 per cent.

Those are the only reasons why we undersell 16 other makes.

Extra Features

In fabric and rubber we give you in Goodyears the best tire men know how to build. Our experts have tried a thousand ways to lower cost per mile, and

they say that No-Rim-Cut tires mark the present-day limit. It is simply unthinkable that any maker has learned a better way to build tires.

We give you in addition four great features found in no other tire.

We give you the No-Rim-Cut feature, which we control, and which has ended rim-cutting completely.

We give you the "On-Air" cure, which saves the countless blow-outs due to wrinkled fabric. This one extra process adds to our tire cost \$1,500 daily.

We give you a method—controlled by patent—which lessens by 60 per cent the risk of loose treads. And we give you the double-thick All-Weather tread, the one anti-skid which runs like a plain tread—which is flat and smooth and regular.

No-Rim-Cut Popularity

No-Rim-Cut tires, even when high-priced, came to outsell any other. And now, after millions have been put to the mileage test, we are selling 55 per cent more tires than in any previous year.

They offer you the utmost in a tire at the lowest price possible now. At a lower price than 16 other makes.



THE GOODYEAR TIRE & RUBBER COMPANY, Akron, Ohio

Toronto, Canada

London, England

Mexico City, Mexico

Branches and Agencies in 103 Principal Cities. DEALERS EVERYWHERE Write Us on Anything You Want in Rubber

(1516)

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PUBLISHER'S AND READER'S PAGE.

The Eighth Annual Touring Number of The Automobile Journal will be issued July 10. Without doubt, this is the most eagerly awaited single number of any motoring magazine published. Each year the demand for this work of reference and routing guide for the ensuing season has increased very materially, and in anticipation thereof provision will be made for an edition several thousand in excess of the regular subscription list.

The 1914 Edition will contain complete routing directions covering every section of the United States and Canada, with particular attention to the short week-end trip, in keeping with the announced intention of the American Automobile Association and the National Automobile Chamber of Commerce to foster such touring through medals and awards. However, the longer tours will not be neglected, and considerable space will be devoted to outlining practical transcontinental journeys, as well as foreign tours of interest.

In Addition to the information applying di-

rectly to the tours themselves, the number will contain numerous special articles respecting the care and maintenance of the machine, the mechanical equipment of the car, complete digest of motoring laws, motoring apparel and every feature making for the comfort and convenience of the tourist.

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Special Attention is drawn once more to the regular departments appearing in each issue of The Automobile Journal, devoted to New Accessories (page 35), Suggestions for New Car Owners (page 41) and Correspondence with the Reader (page 54). These are of direct personal interest, particularly to the owner of his first machine, and readers are invited to make them even more interesting and practical.

The Buyers' Guide on pages 86-96 inclusive, is an authoritative list of reliable concerns in the industry, worthy of the consideration of those in need of anything new in cars, accessories, supplies or fittings. And when corresponding with advertisers, please mention The Automobile Journal.

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Listen to What DAVID L. GALLUP Says About Brake Lining

We print herewith an extract from Prof. Gallup's report at the conclusion of a series of tests made of different brands of brake lining. Five samples were submitted—the five which are most widely used in the industry. Prof. Gallup's report is in part as follows:—

"In carrying out these tests all the samples of brake lining were subjected to exactly the same treatment, the conditions chosen being, as nearly as possible, such as are met with in actual practice. The tests were conducted with the object of determining the characteristics of various samples with particular reference to—

No. 1 Braking Ability (Frictional Quality)

No. 2 Heat Resistance (Durability)

No. 3 Wearing Quality (Durability)

No. 4 Effect of wear and heat upon the braking ability

After a careful examination of the brake linings upon the completion of these tests, and an analysis of the results obtained, it is evident that **MULTIBESTOS** stands superior to the other brake linings tested with particular reference to the following points:—

Braking ability under all conditions of service
Durability
Resistance to effect from heat"

(Signed)

David L. Gallup

Professor Gas Engineering, Worcester Polytechnic Institute, and in Charge of Automobile Testing Laboratory.



Standard Woven Fabric Co.

FRAMINGHAM, MASS.

BOSTON, 903 Boylston St. PHILADELPHIA, 1427 Vine Street.
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CHICAGO, 1430 Michigan Boulevard.



TO feel your car move away instantly, smoothly and quickly when you start after being held up at a street crossing; to feel it "take" a hill and "eat it up" with ease and smoothness; to slow down to three or four miles an hour "on high"; to use only 80% of the accustomed quantity of gasoline; these are the things a Rayfield carburetor makes possible for you.

This means nothing more or less than perfect carburetion under any and all conditions.

Our one object for years has been to build a perfect carburetor; engineers who were earnestly striving to build the best cars recognized the Rayfield carburetor as the kind of carburetor that was essential to their success.

We have been determined to build the best carburetor that money could buy; we spared nothing in cost to ourselves, in time, money, or materials; the result justifies it all; it is what we wanted it to be. It costs a little more than the inferior kinds, yes. Why shouldn't it?

Get the best out of your engine by giving it the best—A Rayfield Carburetor. Your reward will come in increased speed, power and flexibility and in decreased gasoline bills.

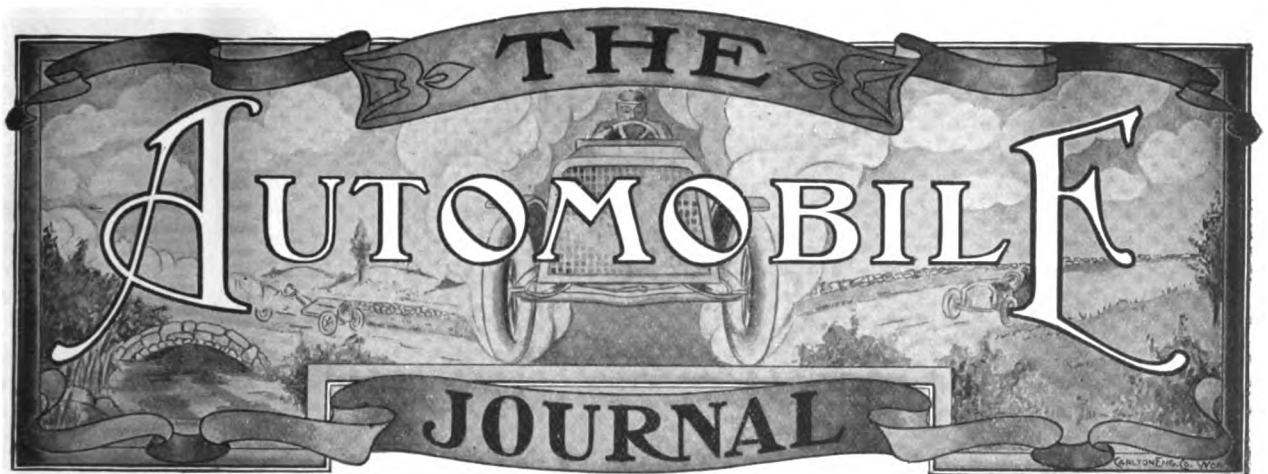
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VOL. XXXVII, No. 7

MAY 10, 1914

Price, \$1.00 the Year

THE UNITED STATES FORCES IN MEXICO.

A Consideration of the Conditions Under Which It Might Be Necessary to Use Motor Vehicles in the Event of More Extended Military Operations.

WITH the American occupancy of Vera Cruz and the possibility of more extended military action in Mexico, motorists very naturally are interested in learning as to what part, if any, automobiles will play in any advance into the interior of the country. Thus far the operations have not reached the point where the situation can definitely be termed war, but this is the nearest approach to war-like conditions which the nation has faced since the practicability of the motor vehicle was established. It also supplies the first opportunity the United States has had

to test the value of aeroplanes in such work.

Motor trucks, automobile ambulances and aeroplanes have been utilized in war with success—in the Italian campaign in Tripoli and during the more recent Balkan troubles. However,

the conditions in northern Africa and southeastern Europe are by no means parallel with those which exist in the Republic of Mexico. It will prove of interest to consider the character of the country in which motor trucks and automobiles are expected to operate were the present situation to become such as to make occupancy of the City of Mexico advisable.



Aeroplane Scouting in Connection with Manœuvres of French Army—A Scene Likely to Be Repeated Many Times in Mexico.

Mexico City is located in the valley of Mexico, which is in reality a wide plateau, between the Sierra Madre Oriental range on the east and the Sierra Madre Occidental range on the west. The city itself is 7400 feet above sea level, or the level at Vera Cruz, and in travelling the 290 miles between the two cities by train an altitude of 8100 feet is reached. This railroad is practically the only means of transportation to Mexico City from Vera Cruz.

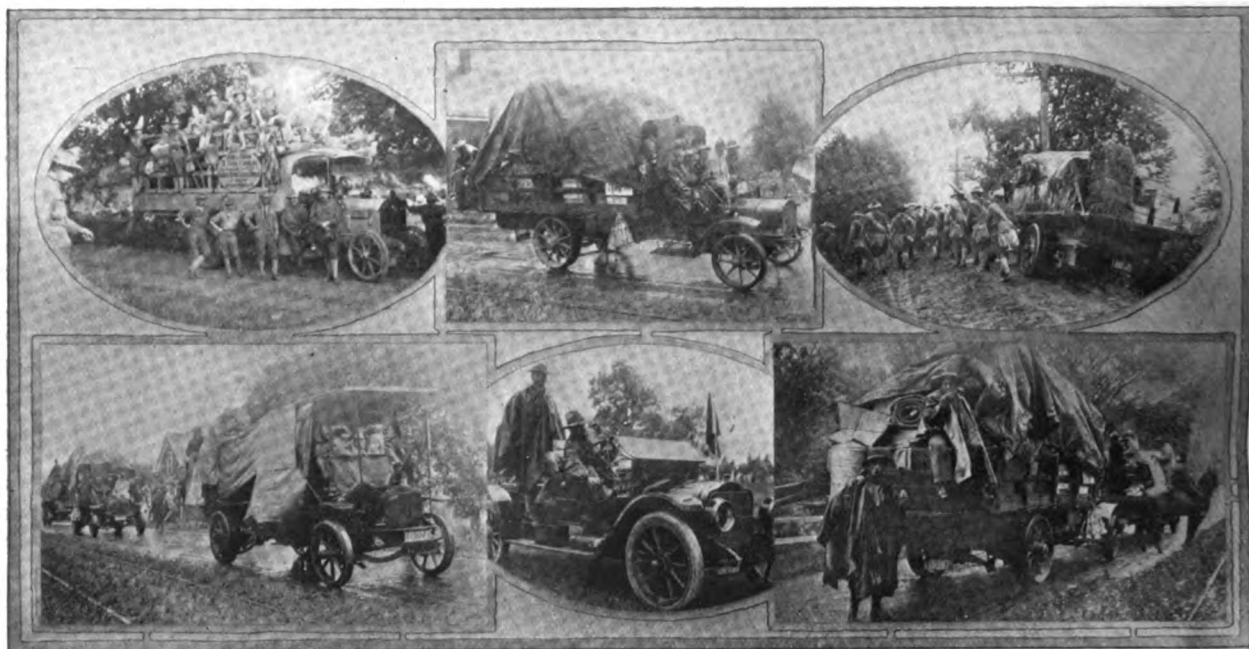
Routes and Road Conditions.

The old national road, over which the American army passed in 1846 is still existent, but Americans resident in Mexico within recent years are authority for the statement that it is seldom used, except by pack animals; at least

hours. Twelve hours are needed from Vera Cruz.

The chief difficulty in reaching Mexico City from the north by road—in times of peace—lies in the presence of numerous "barancas" and the fields of floating sand. A baranca is really a dry canyon. Much of the country is held to have been of volcanic origin, and these fissures vary in depth from a comparatively few feet to many hundreds. Some have been bridged, while others make necessary wide detours.

Automobiles are used in Mexico. The United States shipped 227 to that country in 1913, 274 in 1912 and 297 in 1911. And there are numerous machines of European manufacture sold there. Some of these are utilized by residents of the northern states, near the American bound-



Pierce-Arrow and White Trucks Operating in Connection with Recent Army Manoeuvres in America, Indicating the Character of the Loads Carried—Also Officer's "Mount" in Field Operations Today.

those portions in the two passes through the mountains. In fact, much of the country in these mountains is described as virgin territory, and the railroad winds its way over high trestles, along the edges of precipices 4000 feet deep on concrete retaining walls, and through tunnels, affording abundant opportunities for crippling the train service.

There are two other lines of more or less direct communication between the States and the City of Mexico—one from Laredo, Tex., by way of Monterey and San Luis Potosi, a distance of 800 miles, or a 36-hour run, and the other from El Paso, Tex., by way of Chihuahua and Torreon, a distance of 1200 miles, or a run of 48

hours, and others in the southern states. There are a great many in the City of Mexico, and radiating from this centre are some improved highways—one, at least, is practically 15 miles in length. For the most part, however, these roads only connect the suburbs with the city proper, and there is no such thing as touring in Mexico. It will be remembered, of course, that the Flanders (now the Studebaker) Three Flags car reached the City of Mexico from the north on its trip from Montreal, Can., some two or three years ago.

Machines with Mexican Forces.

There is no means of learning the exact number of motor vehicles at the disposal of the Huer-

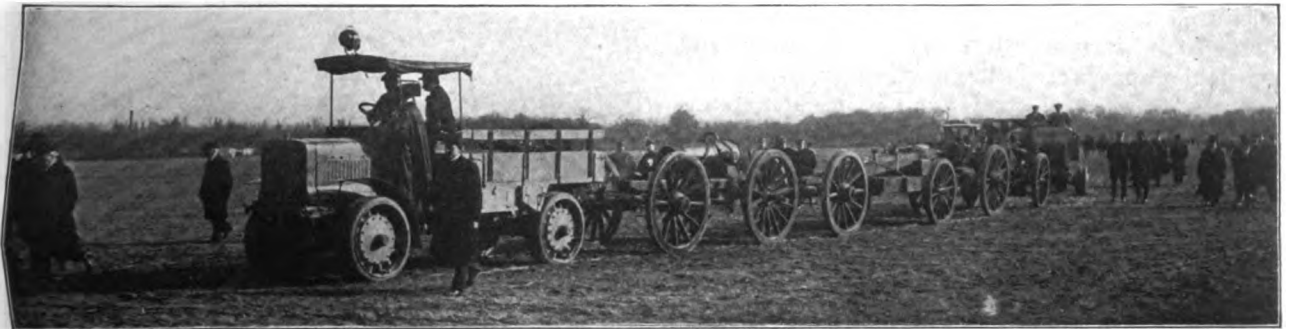


Subjecting Motor Trucks to Severe Road Conditions in Foreign Manoeuvres.

ta government, but it is known that 17 armored motor trucks were being utilized by the Federal forces in northern Mexico, in the vicinity of Nuevo Laredo, last August. What proportion

with road conditions contend that it would be impractical to make use of such vehicles on the Vera Cruz route, while they point to the successful journey of the Flanders as proof of the possibility of reaching the capital from either Laredo or El Paso. It must be borne in mind, however, that this statement is based upon the opinion of a civilian rather than that of a military engineer.

It will be remembered that attempts were made to conquer the Mexicans in the war of 1845-6 by taking the interior route, before it was decided to make Vera Cruz the basis of operations. And it was from Vera Cruz that the city eventually was taken. It may prove of interest



Indicating the Manner in Which the Motor Truck Has Supplanted the Horse in Hauling Field Guns Abroad.

of these has been taken by the Constitutionalists or has been placed out of commission in the interim is unknown. These machines were purchased from American sales agencies in Texas, and were fitted with armor in the military workshops at Nuevo Laredo and Monterey, Mexico. Gen. Villa also has been making use of armored trucks in the campaign in the State of Chihuahua. Some of his officers have touring cars and runabouts as well.

Whether or not motor trucks could be utilized to advantage in an American advance upon the City of Mexico must be largely a matter of conjecture. One guess may be as good as another. Americans who are more or less familiar

to review the history of the Mexican war covering the road conditions.

The advance was made from Vera Cruz early in April, following the course of El Rio del Plan



Hauling Artillery in Cross Country Work During French Army Tests.



White Ambulance in Field Work During Manoeuvres of the New York State Militia.

to Jalapa. This was found to be a continuous ascent, with numerous steep hills, and at Cerro Gordo it became necessary to cut a road along the almost perpendicular bank of the river. This permitted the passage of the infantry, but was found to be impracticable for draft horses, and the field guns were drawn through by hand. Later, however, this road was put in such condition that it was thought possible to haul the wagon trains, but of the 28 wagons which left Vera Cruz only four were able to reach the camp. This was some two months after the passage of the infantry, which was then at Pueblo, having crossed the first pass, awaiting the arrival of stores before attempting the more difficult portion of the route into the capital.

Between Pueblo and Mexico City.

It was found that the road from Pueblo led through a cultivated and slightly undulating country as far as San Martin Tesmalusa, then by a gradual ascent for the most part to the pass of Rio Fero, and a few miles further a rapid descent

into the valley of Mexico. After leaving the base of the mountains the way was interspersed with scattered volcanic hills of considerable height and exceedingly rugged. It was necessary to pass the marshy shores of Lake Tezcuco and along a narrow shelf between the northern base of the mountains and the lake, which was easily defended. The army was compelled to make this journey without its wagon train, because it was felt that the crippling of one wagon even would be so readily accomplished, and that the resulting

congestion would make it impossible to retreat should such a course become necessary.



United States Signal Service Men Operating with the Motor Truck.

Great Britain, France, Germany and Austria have perfected subsidy plans, under which motor vehicles always are at the disposal of the war department and are maintained in good and efficient running condition, in consideration of an annual sum paid the owner by the government. Great Britain is the only one of these countries that has attempted to lay down designs to which the vehicles must be built before they are subsidized, although the others provide certain well defined limitations as to weight, carrying capacity, general specifications, etc.

In the case of Italy, and the countries involved in the Balkan trouble to which reference has been made above, the vehicles were purchased



A Party of Skirmishers Utilizing Automobile in California State Manoeuvres.

outright. The same plan has been adopted by Russia, which owns a number of American made machines; Portugal, which also owns American trucks, and some of the other European countries.

Providing for Military Requirements.

Those nations which subsidize vehicles hold annual trials. With the exception of the annual military manoeuvres in Great Britain, these are held for the purpose of determining what type or types of machines shall receive subsidy, and the regulations are prepared by the war department officials with a view to providing strenuous tests. Russia, at least, follows this course before deciding upon the vehicles it will purchase.

In the United States the subsidy plan has not met with favor on the part of the government, and figures are by no means available to give any



The Curtiss Flying Boat in Practice Flight of United States Navy.

machines which were considered most practical for military purposes, reference being had, in this instance, to military transports. This position was clearly set forth in a letter addressed to manufacturers by Lieut.-Col. C. B. Baker, chief, quartermaster corps, in January, 1913, accompanying which was the following statement of specifications:

United States Army Truck Specifications.

Capacity—One and a half tons; safe overload, 20 per cent.

Drive—Either two or four-wheel drive, at option of builder.

Axles—Front and rear semi-floating or full-floating type, at option of builder.

Motor—Thirty-two to 40 horsepower, at option of builder; water cooled and with four cylinders cast en bloc and of the L or T head type, at option of builder. Magneto and battery dual ignition.

Clutch—Cone, leather faced.

Transmission—Selective type; four forward speeds and reverse.

Speed—From one to 15 miles per hour.

Wheels—Wood, artillery type, 36 inches in diameter; demountable.

Tires—Solid rubber, 36 by four inches; single or double, at option of builder.



Curtiss Hydraeroplane Leaving the Deck of the U. S. Armored Cruiser Pennsylvania.

definite idea of the number of machines that have been purchased. Motor trucks and automobile ambulances have been used repeatedly in military manoeuvres, usually in connection with the state militia organizations, but always under the watchful eye of United States army engineers. In addition, there have been held a number of so-called military trials, in which motor trucks and ambulances have been subjected to certain tests to demonstrate their ability to cope with given conditions.

That the army has been watching the situation is evidenced by the fact that motor truck manufacturers have been invited to co-operate with the government in production of



Hangars of the United States Navy at Pensacola, Fla., from Which Hydraeroplanes Were Taken to Mexico.

Tread—Fifty-six inches.
Wheelbase—One hundred and twenty inches to 144 inches, at option of builder.
Steering—Irreversible wheel, located on left side; extra heavy.
Brakes—Two sets, both attached to rear wheels; one set operated by pedal, other by lever.
Springs—Semi-elliptic.
Frame—Pressed channel steel, heat treated.
Body Length and Width—Ten feet by 3.75 feet or 9.25 by four feet. General design of body to be along lines of that of the present escort wagon; dimensions to be the same as for escort wagon, specifications 1908, amended 1911.
Body Material—White oak, reinforced with angle iron.
Top—Collapsible top over driver's seat.
Height of body platform from ground—Not to exceed 45 inches.
Ground Clearance—Eleven inches or more.
Weight—Complete with body, empty, not to exceed 5000 pounds.
Equipment—Two Prest-O-Lite gas headlights, two mineral oil lights, and one mineral oil tail light.
Gasoline Capacity—Twenty-five gallons.
Oil Capacity—Three gallons.

Experiments on the Border.

Since the mobilization of United States troops in Texas, near the Mexican border, as the result of the internal strife in that country, army officials have been experimenting with various makes, types and sizes of motor trucks under conditions approximating those existing in times of war, with the exception, of course, of that element represented by the presence of the enemy. As a result of these experiments, Maj.-Gen. Leonard Wood, until recently chief of staff, and the man who has been selected to direct any possible movement of the army in Mexico, is quoted as saying:

The time is not far distant when the motor truck can be used in almost any part of the country. They will be used chiefly between the base of supplies and the army, where good roads are assured. It is to the motor truck that the army of the United States must look for transportation for supply and combat trains.

Gen. Wood's statement was made some little time ago, before the present situation arose, and it must not be understood that his reference to "country" has any particular application to Mexico. That is to say, the quotation bears testimony to the efficiency of the motor truck as demonstrated by the tests in Texas, rather than to any proposed action in Mexico.

Right to Commandeer.

It is a well established axiom of military law that the government would have the right to commandeer from the commercial community all the motor vehicles it might need in times of war, providing it were found impossible to purchase such machines in the open market. There is little probability that the army would be handicapped in any way in securing a generous supply of such equipment.

The use of motor trucks, or of horse wagons, in times of war, and particularly in the enemy's country is in no respect analogous to similar

use in times of peace. The United States army is much better equipped with engineers than was true in 1845. Conditions which might have offered almost impossible obstacles at that time are much more readily met today. The only attempt that has been made herein is to present the situation as it appears to exist, from information supplied by those assumedly in a position to know. Whether or not motor trucks and automobile ambulances can be used to advantage is entirely a matter to be determined by the army engineer.

Use of Aeroplane.

Insofar as the aeroplanes are concerned, already they have demonstrated their value for scouting to the naval and military authorities in command at Vera Cruz. Hydraeroplanes were transported by the warships sent to take the port and they have been utilized almost continuously in determining the position of the Mexican forces since American control was established. Thus far the aviators have succeeded remarkably well in carrying out movements repeatedly tested at the various government aeronautic stations during the past few years, without getting in range of the enemy's fire, although at least one machine is reported as having returned to headquarters with a rifle shot through one of its wings.

DIXON COMPANY'S OFFICERS.

Largest Meeting of Stockholders Yet Held Re-Elects Old Board of Directors.

At the annual meeting of the stockholders of the Joseph Dixon Crucible Company, held at the company's main office in Jersey City, N. J., April 20, the retiring board of directors, consisting of George T. Smith, William Murray, George E. Long, Edward L. Young, William G. Bumsted, J. H. Schermerhorn and Harry Dailey, was re-elected. The officers also were re-elected as follows: President, George T. Smith; vice president, George E. Long; treasurer, J. H. Schermerhorn; secretary, Harry Dailey; assistant secretary and treasurer, Albert Norris.

The meeting was attended by a large number of stockholders, who expressed satisfaction with the present management and recorded the largest vote ever represented at an annual election—9628 out of a possible 10,000 shares.

George E. Daniels, vice president and general manager of the Oakland Motor Car Company for the past four years, has announced his resignation. He is not ready to make a statement as to his future plans.

THE FIRST CAR TO CROSS THE ANDES.

History Making South American Transcontinental Trip from Buenos Aires to Valparaiso by Johnson Martin and Otto Johanson of the United States.

Arrived safely this morning in Santiago. Highest altitude 13,000 feet. Everything snow above 11,000 feet. Terrible cold. Two weeks in mountains crossing Continental Divide. Feat never before accomplished. Great enthusiasm Santiago and Valparaiso.

JOHNSON MARTIN.

OFFICIAL reports of great accomplishments may fire the imagination, but they lack in romantic detail. When the Pan-American Union in Washington, D. C., received the above cablegram, Feb. 28, the American people were soon made aware of the fact that Johnson Martin, a graduate of Princeton, and Otto Johanson, his mechanic, had at last succeeded in crossing the Andes in an automobile. Complete details are still lacking, but the accompanying story of the trip is compiled from information contained in a letter from Johnson Martin to Franklin Adams, chief clerk of the Pan-American Union, to whom The Automobile Journal is indebted as well for the photographs from which the illustrations were made.

Martin and his companion did more than cross the Andes, although that is in itself a feat which had often been attempted. During the past year there has been decided rivalry between aviators and motorists in South America for the honors now held by these two men. While they were in the mountains, Jorge Newbery lost his life in an attempt to fly over the Uspallata pass from the Argentine side. The distance between Mendoza, Argentina, and Los Andes, Chile, is but 230 kilometers (143 miles), but unexpected irregularities of the air in the cleft through the mountains make flight dangerous, and, thus far, impossible.

The two North Americans not only negotiated the difficult Uspallata pass, but they are the first motorists to make a transcontinental trip across South America. It must not be understood that the machine travelled under its own power the full distance. There were times where it was impossible to make headway without

turning the car on its side—but, to tell the story in chronological order:

The Trip in Detail.

Johnson Martin and Otto Johanson left Buenos Aires, Argentina, Jan. 30, in a Buick car, made by the Buick Motor Company, Flint, Mich. The information thus far received makes no mention of the chassis equipment, other than the magneto and spark plugs, which were Splitdorf, the product of the Splitdorf Electrical Company, Newark, N. J. These performed their respective duties without trouble throughout the entire trip from coast to coast.

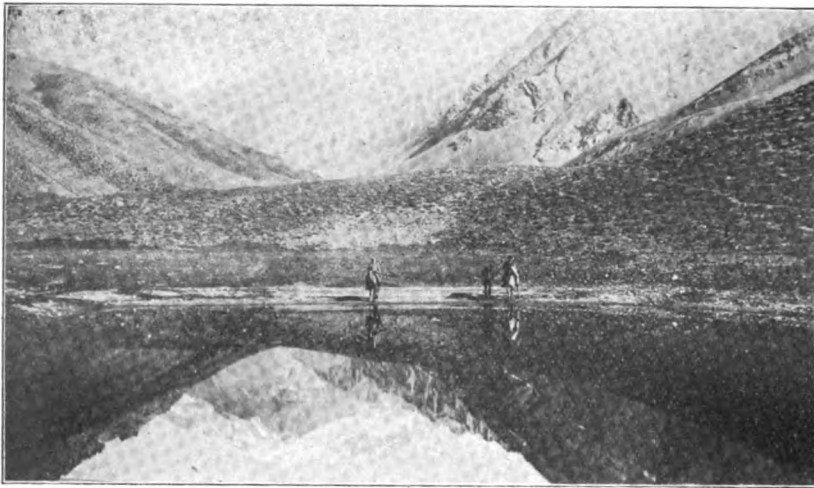
They followed the national highways to Villa



Street Scene in Buenos Aires, Argentina, from Which Point the Transcontinental Journey Was Begun.

Mercedes, a distance of 793 kilometers (492 miles), which, because of the many ponds and large swamps encountered, was not reached until three days later. A whole day was spent here, the time being devoted to cleaning the car, before the journey was resumed to San Luis. Here they were delayed again for half a day, on account of a heavy storm.

Leaving San Luis in the night, the trip to Jarilla, about 970 kilometers (602 miles) from Buenos Aires, afforded its full quota of difficulties. The roads were narrow paths and very rough, and in many places it became necessary for the men to walk beside the car in order to



**Laguna Negra, at the Base of Mount Aconcagua in the Uspallata Pass—
Turn Picture to Note Reflection in the Water.**

direct its course. Proceeding under these circumstances, in the dark, and encountering a sharp turn in the road, neither of the men saw some large mesquite bushes which blocked the way. They lost control of the machine, which followed the trail for a short distance, then plunged into the brush, where it soon met with obstacles which stopped the motor.

Crossing the Low Lands.

After vainly searching for the machine for a time, resort was had to a megaphone, which they were carrying for use in case of need. It transpired that the men were only about a league from Jarilla, and a number of persons answered their call, taking them to a storage shed or warehouse at the railroad station. It rained hard during the night, but when the car was found the next morning the only damage was a badly bent axle, which Johanson succeeded in straightening so that it could be used.

At 1 that same afternoon they left for Desaguadero and La Paz, arriving in the latter town about midnight. Here they were refused admission at the hotels, because of their appearance, and it was only after some of the residents had set their dogs upon them that they were able to receive attention. The following morning the axle was taken to a blacksmith shop, where it was repaired.

The next stop was San Martin, which was reached just in time, since the gasoline gave

out as the car stopped in front of a store where the tank could be refilled. Three days were spent in Mendoza, in an attempt to secure information as to practical routes into the pass. At last it was decided to follow a line of telegraph poles, which eventually led to Villavicencio, from which point they easily found the way to Las Higueras.

This town virtually is the entrance to the Uspallata pass, which is the best known of all the passes over the Andes from Ecuador to Patagonia. Through it San Martin's army crept on its search for conquest. Over it all the transmontane mail and

passenger traffic has long been sent. The road from Las Higueras to Uspallata is nothing but an old mule trail, and the motorists found it one of the most difficult and dangerous sections of the entire trip. At one place but four kilometers (about 2.5 miles) was covered in four hours. They were finally compelled to abandon the attempt, and slept on the rocks. In the morning they followed the bed of a dry river and arrived in Uspallata at 12:30 at night.

Here they were entertained royally by a genial Chilean gentleman, Jose Correa, who took great interest in the enterprise and offered all kinds of assistance. One whole day was devoted to exploring the pass for the purpose of finding a road which would permit the car to proceed under its own power, Senor Correa accompanying the party. He was informed that the



Punta de Vacas, on the Road Between Argentina and Chile in the Uspallata Pass of the Andes.



Where Gen. San Martin's Artillery Crossed the Valley of the Horcones, Aconcagua in the Distance.

trails between Uspallata and Punta de Vacas had not been used by wagons or carts, even, since the time Gen. San Martin crossed the mountains with his artillery. When the trip was again resumed the car was accompanied by two of Senor Correa's men and two horses.

Entering the Pass.

It will be understood that at this point the trail begins its ascent to an extreme elevation of 12,500 to 13,000 feet, and the peak of Aconcagua towers above it, 23,392 feet above sea level. The scene is extremely awe inspiring, but it is feared that the motorists failed to appreciate much of its beauties. The car proceeded under its own power for a time, in spite of the hard work, and after much battling in the night the party reached Ranchillo brook, which flows into the Mendoza river, and camped upon the stones.

Getting an early start the next morning, the Pichenta river was soon reached, and here the car was forced to abandon the task for the time being. The only means for crossing the river was by an ancient bridge, constructed for the use of pack animals. As the width of the machine was exactly the same as that of the bridge, it was necessary for the four men to carry the automobile across above the railings. It took 26 hours to cover one kilometer on the way to Cortaderas, and in some places the car had to be turned on its side, the men pushing it along as best they could because of the narrow path.

Soon after leaving Cortaderas as they reached Polvaredas and the Paramillo river, where there was a steep winding road of about 100 meters. Here it was necessary to use the two horses, until one of them fell into a canyon several meters deep and was instantly killed. Still following the river and overcoming obstacles as best they could—the road having been swept away in places by landslides, which occur continuously—Punta de Vacas was reached at 8 in the evening of Feb. 18.

Mr. Martin states that the first tire trouble was had on the way between that city and Inca, which distance was covered in two hours. This certainly speaks well for the make of tires used, and the name of the manufacturer would prove interesting to automobile owners. During the stay at Inca, opportunity was had to test the different kinds of baths which are found there, and it may be added that the rest was needed in view of the fact that the steepest part of the climb was yet to come.

Nearing the Summit.

On the morning of Feb. 20 the journey was continued to Las Cuevas, which was reached the night of Feb. 21, after repeating many of the experiences of the previous days. Mr. Martin does not give any information as to the action of the carburetor in this high altitude, but the remainder of the distance between Las Cuevas and La Cumbre (the summit) was made between daylight and 4 in the afternoon.



One of the Better Sections of the Mule Trail on the Chilean Side of the Pass, on the Way to Los Andes.

Here the car stopped opposite the beautiful statue of Christ of the Andes, marking the division line between Argentina and Chile. For the first time in the history of the world an automobile had crossed the entire country of Argentina. The boundary was not actually crossed until the next morning, after breakfast in La Casa de Piedra (the Stone House).

Chilean Roads Much Better.

The roads on the Chilean side were found to be well kept, and quite in contrast with those in the Argentine Andean section. Good time was made running down the mountain to Caracoles, the route lying near the lake of the Inca, but, due to the fact that this portion of the trip was made at night, the motorists failed to see the high precipices of which they had heard so much. Early in the morning of Feb. 23 they reached Rio Blanco, where they breakfasted, and continued to Los Andes, which was entered at 2:30 in the afternoon. They went immediately to the customs house and the prefect of police, who certified to their arrival.

Leaving Los Andes at 2:30 the next morning, the journey to Santiago was made before 7:30 in the evening. Here they were greeted with great enthusiasm as they drove through Independence avenue. The remainder of the trip to Valparaiso was made over good roads, and was not undertaken until the two men had undergone a good long rest in Santiago.

At the End of the Trip.

A newspaper clipping accompanying the letter tells of the machine's appearance upon its arrival in Santiago, after covering 1900 kilometers (about 1180 miles) since leaving the shores of the Atlantic, as follows:

Showing the effects of the trip, but undaunted, the two brave Yankees arrived in Santiago last night. They were like a pair of gladiators after a battle. They had completed the great trip, and on their faces glowed expressions of triumph and pride, which seemed to sing a hymn of victory and suffering.

Their automobile was on the street below, covered with dirt and mud, broken here, patched there; the pneumatic tires in tatters, the gasoline tank dry, the springs, nuts and gears the worse for wear; the entire machine appearing to the eyes of the wondering multitude like the mail of a fantastic warrior who had valiantly battled for a good cause in an unknown country and had been victorious.

The general offices of the United States Light & Heating Company will be removed from 30 Church street, New York City, to the factory at Niagara Falls, N. Y., May 20. This transfer will result in bringing together all the administrative, sales, engineering and production departments, and is expected to insure the most effective conduct of all in the interests alike of patrons and stockholders.

GLIDDEN TOUR RULES.

Regulations Governing the Night and Day Chicago-Boston Non-Stop Run.

As is already known, the Glidden trophy will be the principal award in the night and day non-stop run from Chicago to Boston, June 29-July 2, under the auspices of the American Automobile Association. There will be three divisions, one for stock cars listing at over \$1200, for which the Glidden trophy is offered; one for stock cars listing at \$1200 and under, for which the award will be the A. A. A. trophy, and a non-stock division for private owners, in which the Anderson trophy will figure as the chief prize. In addition, certificates of economy attesting the fuel consumption will be issued to those entrants of cars indicating their desire for such a test, and certificates of merit to all cars finishing the run without stoppage of the motor.

The cars will leave Chicago at 2 in the afternoon of Monday, June 29, and will reach Boston at 12 noon, Thursday, July 2. A schedule of 20 miles an hour will be maintained between sunrise and sunset, 15 miles an hour between sunset and sunrise the first night, and 18 the other nights. Controls will be established at Bryan and Cleveland, O.; Buffalo, Syracuse, Albany and New York City, N. Y., and Springfield and Boston, Mass. Additional supply stations will be established at intermediate points, where gasoline, oil and water may be obtained. Cars will be penalized for lateness at controls, but not at the supply stations. Penalties will also be imposed as follows:

One point per minute or fraction thereof for lateness at all controls.

Stoppage of motor voluntarily or involuntarily either in or out of controls at any time during the entire contest will disqualify.

No penalty will be imposed for repairs, replenishments, or replacements of tires, or the fitting, repairing, or removing of anti-skid devices, but the time consumed in such tire work will not be added to running schedule. Replacement or cleaning of spark plugs is permitted on the road, but time is not added to the running schedule.

Where penalties are imposed for time consumed in work by drivers, passengers or others, the consumed shall be added to the running schedule.

The use of self-starters is prohibited under penalty of disqualification, and where self-starting is a part of the equipment of the competing car, the self-starter connection shall be disconnected and sealed by the technical committee previous to the start. On all cars the starting crank will be sealed.

Oil or grease may be added to or drawn from the various cases without penalty when in control. Lubricating all parts of cars, such as crankshaft, filling and turning of grease cups and other parts is allowed in control.

No adjustment of carburetors, magnetos, brakes, steering gear, springs, or similar adjustments, will be permitted at any time without penalty.

In case of a tie for the trophies, prizes will be awarded on the basis of a final technical examination and test in which penalties will be assessed for: Faulty brakes, broken radius rod, bent axles, missing cylinder, broken springs, faulty steering gear, faulty gearset.

DETAILS OF THE SALVADOR LIGHT CAR.

THE Salvador light car, built by the Salvador Motor Company, with general offices at 126 Massachusetts avenue, Boston, Mass., and a temporary factory in that city, has been developed to supply the ever increasing demand for a comparatively small vehicle, having seating capacity for two, that has every essential quality of the high priced machine and the added value of extreme economy. The initial cost is small, but nothing that makes for comfort or convenience of the owner or operator has been sacrificed. It is intended for the service of those who desire a comparatively inexpensive machine, with speed the equal of larger cars, that can be used the year round for business purposes if need be, and has such qualities that it may be used with satisfaction by those who have large vehicles that are not desirable for town or general utility service.

The Salvador is not a cyclecar. It is light, having one horsepower for every 50 pounds of weight; it will give 50 miles an hour on any road on which that speed is safe; it is extremely economical of fuel, lubricant and tires; it is as comfortable as the most luxurious touring car; it has every desirable accessory; it is built to have unusual endurance, with wide margins of safety and of high grade materials; it is designed to be practical in all operating conditions; it is so accessible and so well simplified that minimum labor is necessary for care and upkeep.

Use of Gearless Differentials.

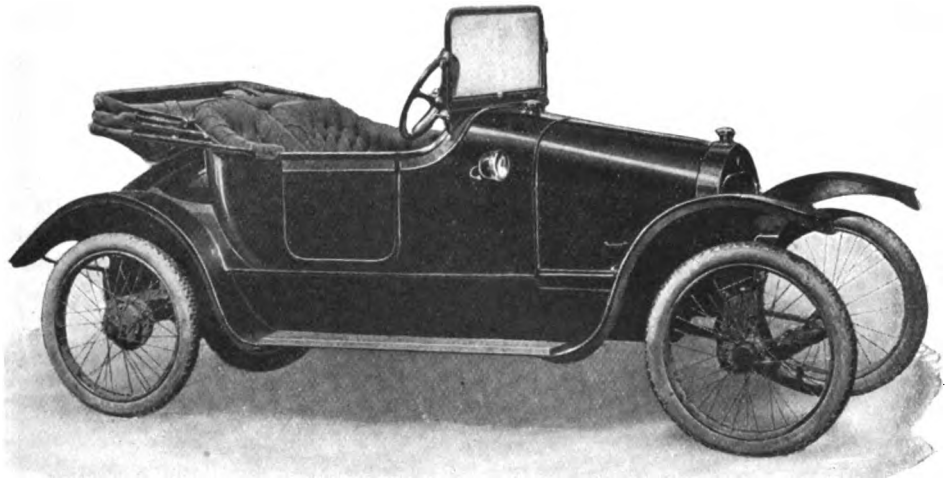
As an engineer's work the Salvador car has much to attract attention. It is not conventional in all details of chassis construction. For instance, the power transmission system has been simplified by dispensing with the usual bevel gear differential. Instead of the divided rear axle driving shaft a solid shaft is used on which the bevel gear is mounted. In the hubs of the rear wheels are "gearless differentials", which are in reality sets of two clutches, one of which

engages when the machine is driven either forward or backward, while there is fullest compensation when turning. The clutches are positive in operation and require no attention whatever.

Cantilever Spring Suspension.

The suspension is full cantilever, the body being carried between the extremities of cantilever springs, which take the driving thrust, so that deflection and reflexion resulting from road conditions are minimized. The car is extremely easy riding, remarkably steady at any road speed, responds instantly to acceleration, takes grades with surprising ease, and can be handled with the same certainty obtaining in the larger machine.

The purpose of the designer was to produce a

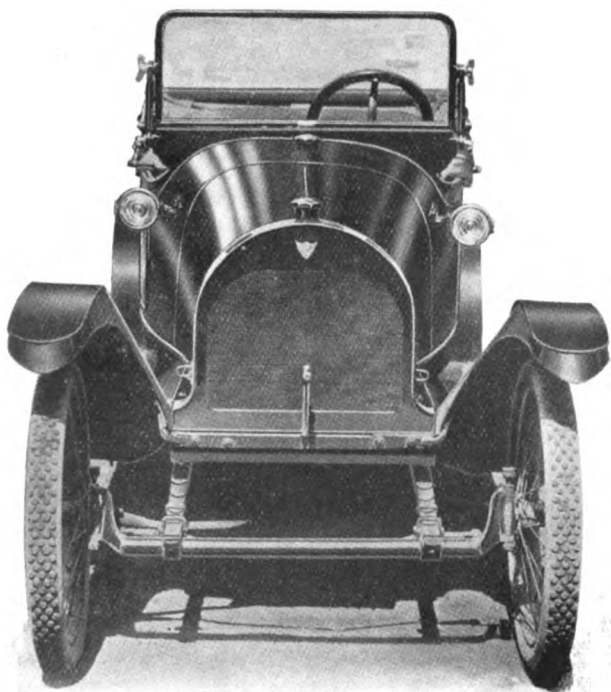


Salvador Car, Having Full Cantilever Suspension and Unit Power Plant, Equipped with the Standard Luxembourg Body.

vehicle that would not only have every driving and operating quality, but to construct it of material that would endure. The chassis is built of carefully selected materials and the body and equipment are at parity with the constructional standard. Provision is made for every comfort and convenience that would appeal to the experienced motorist, and nothing that could be desired is lacking. The body design is unusually attractive and it is finished with much care. Details have been carefully thought out. The lines are graceful, the seats are spacious, the leg room is ample, the provision for storage is surprisingly large, the running boards are clear, and the arrangement of the accessories is admirable.

The power plant is a unit, the motor, clutch

and transmission gearset being as complete and as well designed and harmonized an assembly as can be found in the highest priced four-cylinder pleasure cars. This consists of a four-cylinder,



Front View of the Salvador Car, with the Effective Streamline Hood and Cowl of the Luxembourg Body.

four-stroke cycle, water-cooled engine of the block type, a leather-faced cone clutch and a selective sliding gear transmission gearset affording three forward speed ratios and reverse. The control is by a centrally located hand lever that is operated in a conventional H slot quadrant. The motor is an L head type with the valves at the right side. At the S. A. E. formula the rating is 12.1 horsepower, but at maximum speed of 1100 revolutions 18 horsepower is produced. The bore is 2.75 inches and the stroke four inches, this giving a ratio of bore to stroke of 1:1.454, which dimensions were determined after careful investigation of the requirements with reference to American roads, efficiency, period of endurance, fuel consumption and smoothness of operation.

Motor Cast En Bloc.

The cylinders and crankcase are cast en bloc with fuel intake and exhaust manifolds integral, the manifolds being with easy sweeps and large areas. The water jackets are ample, insuring positive cooling, these being designed for thermo-syphon water circulation. The walls are uniformly thin, this making for weight reduction.

The crankcase is a barrel form, to which is bolted an oil reservoir of three quarts capacity. The cylinder heads and their water jackets and the water outlet manifold are a separate casting that is fitted with a copper-asbestos gasket and retained by 14 bolts. This construction insures better cylinder castings and machine work and absolutely equal combustion chambers. The water outlet and the passages in the cylinder head casting are very large, to obtain unrestricted circulation. The machine work is done with much care and the cylinders accurately finished. The pistons, as is the cylinder block, are cast of a fine quality of gray iron. They are carefully finished and carry four Wasson compression rings, three above the wristpin and one at the skirt.

Ample Bearing Surface.

The crankshaft is a two-bearing type, of special alloy steel, with flanges to take end thrust and designed to have extreme rigidity. It is drop forged and is machined and ground, double heat treating insuring great strength. The forward main bearing is 3.5 inches length and the rear main bearing four inches, with diameter of 1.5 inches. The crankpins are 1.375 inches diameter. The camshaft is a 15-20 carbon steel drop forging with the cams and gear flange integral. This is also double heat treated and all wearing parts are hardened and ground. The main and camshaft connecting rod bearings are a fine quality of die-cast babbit bearing metal, which are carefully fitted. The connecting rods are I section alloy steel drop forgings that are double heat treated. The wristpins are seamless steel tube, hardened and ground. These are clamped in the small ends of the connecting rods and oscillate in bronze bushings in the piston bosses. The big ends are fitted with caps retained by bolts.

Valve Operating Mechanism.

The camshaft gear is bolted to the flange of the shaft, the gear being of large diameter. The timing gears are of special iron and sized and cut with a view of obtaining endurance, the largest gear being 5.75 inches diameter. The gears are operated in a bath of oil, this minimizing noise. The cams are shaped to be practically noiseless. The valve ports are 1.125 inches diameter. The valves are nickel steel heads and carbon steel stems, electrically welded, and have a lift of .28125 inch. The valve stems operate in bushings in the cylinder block. The springs are helical, oil tempered, and are retained by collars and keys. The tappets are a mushroom type that move in bushings inserted in the crankcase. They are adjustable by screws and nuts. The valve steps, springs, tappets and adjustments

are enclosed by removable cover plates.

The motor is lubricated by a constant level splash system supplied from a reservoir bolted to the crankcase. The oil is drawn from the reservoir by a plunger pump, after filtration, and forced through a tube that supplies the timing gears and the oil troughs beneath the cranks, the overflow draining to the reservoir. The distribution is by splash to the shafts, bearings, tappets, cylinders and pistons. A float gauge shows the volume in the reservoir and an automatic overflow prevents the oil reservoir being flooded. Over-lubrication is impossible and the motor will never smoke.

The cooling is by thermo-syphon circulation of water through a radiator of special design, supplemented by a steel bladed fan on an adjustable ball bearing bracket driven by a flat belt from a pulley on the crankshaft extension. The ignition is by a high-tension oil and dust proof magneto, driven by a gear that meshes with the camshaft gear. By removing four bolts the housing, gear and magneto can be taken off. The carburetor is an automatic float feed double jet type that is stated to be extremely efficient and economical.

Clutch and Gearset.

The cone clutch is in combination with the flywheel and pressure is afforded by three helical springs that insure equal pressure, and which are adjustable. The leather facing of the cone covers three flat springs that insure ease of engagement. The thrust is taken by a self-aligning ball bearing. The leverage is compounded so very slight pedal pressure is necessary. The clutch pedal is rubber padded.

The gearset is compact and the spline or primary shaft is large diameter, supported on ball bearings. The lay shaft gears are keyed on to the walls of a heavy seamless steel tube, bronze bushed at either end, that runs on steel stubs that are hardened and ground. The gears are 8-10 pitch, stub toothed, .6125-inch face, of special analysis steel that is double heat treated and oil hardened. The third speed ratio is direct drive, the second ratio is 1:1.52, the low is 1:3.08, and reverse is 1:3.75. The clutch and the gearset are completely housed and protected from dust, and are effectually lubricated. The materials of the power plant are high grade, all machine work is to close limits, and every part is interchangeable.

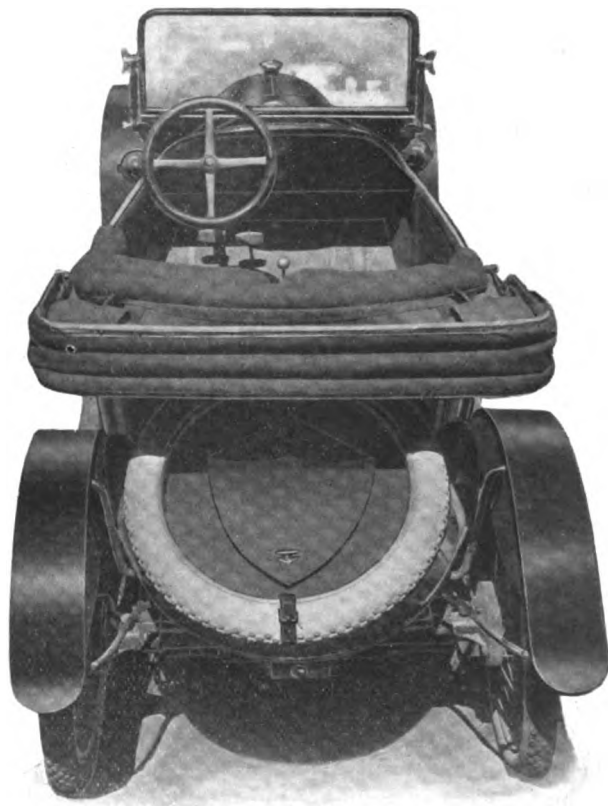
Three Point Suspension.

The power plant is mounted at three points, on a cross member at the forward end and by cross arms to the chassis frame at the sides. On

top of the gearset case is mounted the quadrant and the control and brake lever.

Back of the gearset case is the transmission brake, this being a band contracting on a drum carried on the shaft, and operated by the hand lever in the event of emergency. Immediately behind this is a Spicer universal joint, and the end of the rear yoke of the joint is a square sleeve that carries the forward end of the main driving shaft, the shaft having a telescoping movement in the sleeve. Surrounding the shaft is a torque tube that has a Hyatt roller bearing and a ball thrust bearing at the forward end. The rear end of the shaft similarly telescopes into the pinion shaft that is carried on a Hyatt roller bearing and a thrust bearing.

The rear axle consists of two cast steel center sections, two tubes and two cast steel end sections. The driving shaft is a single drop forging with a centre boss on which is mounted the



The Salvador Car as Seen from the Rear, with the Tire Surrounding the Shield Cover of the Storage Space Behind the Body.

bevel gear. At either side of this is a Hyatt roller bearing and a ball thrust bearing. The shaft ends are similarly mounted. The castings forming the axle housing ends carry the brake

flanges and the spring seats. The ends of the axle shaft have fixed upon them the clutch or differential plates, and the rear wheel hubs contain the other sections of the clutches. The clutches are operated by gravity, the clutching being by the falling of small discs that cause engagement, and are instantly released by cessation of pressure upon them. At the clutches are operated dry, and are protected against oil or dust, there is no possibility of defective operation. The cost of renewal, after long period of wear, is trifling.

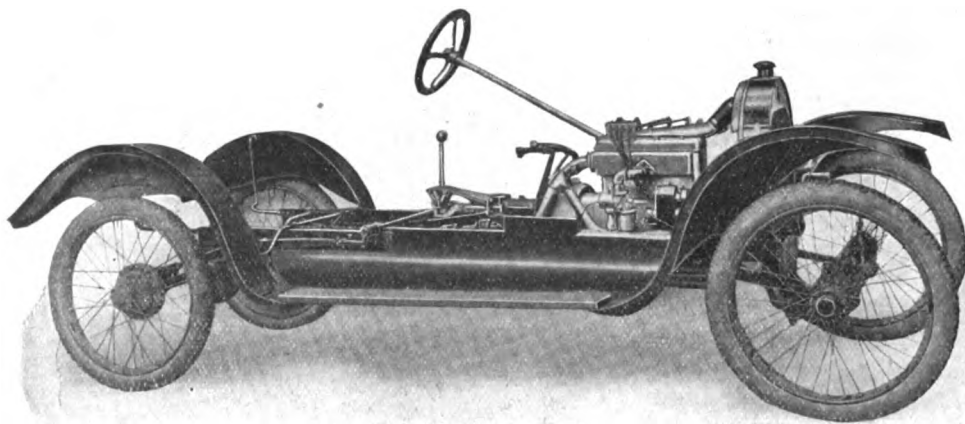
The Frame Construction.

The chassis frame consists of a side and a front member of pressed steel channel section, with three steel cross members and two spring tierods back of the power plant. The frame is extremely well constructed. The rear springs are mounted at the forward ends with short shackles

in alignment. The front axle is tubular with drop forged knuckle yokes and large pivots that are provided with grease cups.

The wheels are wire construction, 28 by three inches, with steel rims, of the clincher type. The rear wheels carry the service brake drums. The forward wheels are mounted on ball bearings of the cup and cone construction. The machine is driven at the left side with centre control. The steering wheel is 15 inches diameter and the steering gear is a worm and sector design, the tie bar and drag link being behind the forward axle. The wheel carries the ignition control lever. The fuel supply is controlled by an accelerator pedal. The service brake is operated by the right pedal, this actuating internal expanding shoes in drums in the rear wheels. This brake is equalized. The emergency brake is on the driving shaft and is operated by a hand lever.

The gasoline tank has 7.5 gallons capacity and the feed is by gravity. The tank is in the cowl of the body, and in front of this is the instrument board, on which is placed the electric light gang switch, the magneto switch, the clock and speedometer. Under seats is storage space, so running boards are clear.



Side View of Salvador Chassis, Ready for Body Installation, Showing the Power Plant and the Control Levers, Pedals and Steering Wheel.

supported by the front tierod. A third of the length of the spring back of the front end is placed the cast steel saddle, in which is drilled a .75-inch hole. The second tierod extends across the frame and the ends are mounted in castings bolted to the side members. The ends of the tierod fit the holes in the saddles. The rear ends of the springs are carried back and are bolted and clipped to the seats on the rear axle, this preventing extreme stress upon the master leaf. The forward springs are mounted on seats bolted under the frame side members, the shackles also being beneath them, and the forward ends are secured to the front axle by bolts and clips to the extended seats. It will be understood that the drive is through the springs, and the body is supported from the spring ends, so that there is never reflexion above the line of deflection caused by the load. The shackle movement is extremely small. Frequent clips insure the springs being

The machine is lighted by electric lamps, the current being supplied by a six-volt 40-ampere battery, by a single wire system.

Body Lines Attractive.

The fenders are graceful in design, with long sweeping curves, and are flanged. The running boards are covered with rubber matting with metal binding. The body is distinctively attractive, being a Luxembourg model with streamline effects, which is extremely large, and the cowl and hood sweep off to the radiator with very pleasing effects. It is of metal on a heavy wood frame. The body is entered from the right side by an 18-inch door having invisible hinges. The upholstery is of fine curled hair and blue motor cloth that is cravenetted, over high quality springs. The standard finish is dark blue with a ribbon of robin's egg blue at the top of the body. Back of the seat is a large storage space that is reached by lifting a shield, and on this the spare

tire is carried. In this space is carried the battery.

The car is fitted with a one-hand mohair top and a one-piece windshield, 34 by 18.5 inches, that swings at the centre. The car is fitted as regular equipment with electric lamps, windshield, storage battery, vibrating horn, tool kit and wheel jack. It can be equipped as extras with top, speedometer, tire and tube and clock, and an electric engine starter can be installed when desired.

The wheelbase is 100 inches, the tread 46, and the road clearance is 9.5 inches. The weight is 900 pounds and the speed is guaranteed from four to 50 miles on the high speed, so extremely flexible is the engine.

Plans for Production.

The production of the cars is limited this year to 1200, of which 500 have already been sold for exportation, the order of 10 demonstration cars now being made up for as quick delivery as is possible. These must be in England by July 1. The remainder, 700 cars, will be divided between New England and New York sales. The company plans to erect a modern and up-to-date factory in the Boston district in the early fall. This plant is designed to turn out 10,000 Salvador cars annually.

MILLER'S 1914 CATALOGUE.

Facts Concerning a Work That Has a World Wide Circulation of 100,000.

The 1914 catalogue of Chas. E. Miller, 97-103 Reade street, New York City, the pioneer automobile accessory dealer, is just being mailed, and it is announced that it will have a world wide circulation of 100,000 copies. It requires 50 one-ton trucks to make delivery to the postoffice, and such as are intended for foreign countries are shipped by freight to the point of entry, where they are mailed by brokers. Miller pays 15 cents duty on each book thus sent.

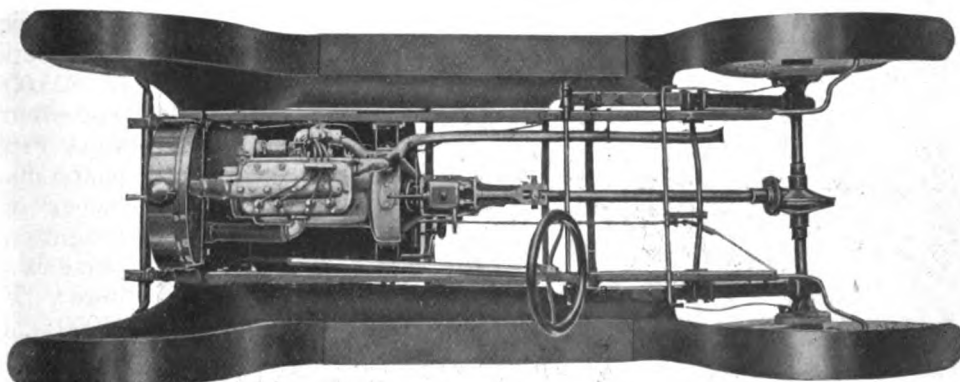
The white paper as it comes from the mill, in one continuous sheet, would make a band five feet wide extending from New York to Wash-

ington. The pages laid end on end would make a band 7.25 inches wide that would reach 1925 miles from New York City. The printing surface in the catalogue is 13,721,525 square feet. Piled flat on top of each other, the issue would make a tower nearly 2000 feet higher than the combined height of the three tallest buildings in New York, if they were placed on top of each other. This book will be mailed free on request.

CONCERNING THE KNOX SALE.

Final Outcome of the Company's Affairs Meets with Very General Approval.

Friends of the Knox Automobile Company, Springfield, Mass., are much pleased that the final outcome of its affairs, as related in more de-



Top View of the Salvador Chassis, Showing the Power Plant and the Transmission System, and the Frame Construction and the Rear Spring Design.

tail elsewhere in this issue, has been arranged so satisfactorily. The Knox company was one of the old, original automobile manufacturers in the United States, putting out its first car in 1899, and its product early found its way into every state in the Union.

The recent sale of the property to E. O. Sutton, which has been confirmed by the court, has placed it in the hands of parties who promise to extend the business on a much wider scope of national standing than it has ever enjoyed. It is stated as Mr. Sutton's intention that the active manufacture of pleasure cars, tractors and fire apparatus will be continued.

It is announced by the new management that the company is now selling out all its present limited stock of pleasure cars and trucks to make room for the new product which will shortly be manufactured, and that the factory has been carefully systematized and rearranged to carry forward an enlarged production along the most approved manufacturing methods.

FORTY-FOUR ENTRANTS FOR BIG RACE.

AT LEAST five countries, America, France, Germany, England and Italy, will be represented in the annual international sweepstakes 500-mile race on the Indianapolis motor speedway, Memorial Day. May 1 the entry list showed a total of 44 possible starters, although the number which actually will be permitted to start is limited to 30. Qualifying trials will be held May 27, at which time it is expected that the number will be reduced somewhat. At present, however, the entry list reads as follows:

Stutz, Gilbert Anderson; Stutz, Earl Cooper; Stutz, Barney Oldfield; Mercer, Spencer Wishart; Mercer, Caleb Bragg; Mercer, Edwin Pullen; Peugeot, Jules Goux; Peugeot, George Bollot; Peugeot, Arthur Duray; Mercedes, Ralph Mulford; Mercedes, Ralph DePalma; Delage, Albert Guyot; Delage, Rene Thomas; Excelsior, A. Christiaens; Burman, Robert Burman; Burman, William Knip-

having them in the best of condition for the qualifying trials, May 27. In these trials each machine will be required to show a speed of 75 miles an hour for one circuit of the speedway. Those not ready to take this test on the date specified will be eliminated automatically. Two days previous to the race, all steering knuckles, tierods, etc., must be changed.

SIoux CITY 300-MILE RACE.

Big Purse for Opening Event on New Speedway in Iowa, Independence Day.

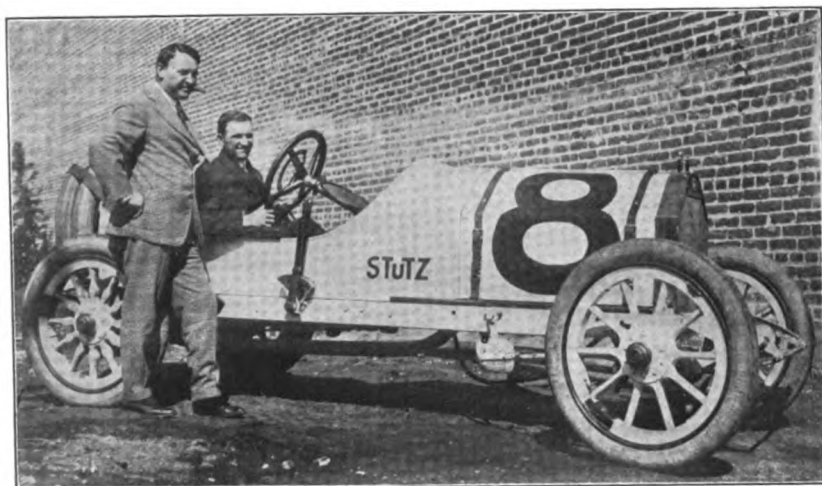
The management of the new motor speedway at Sioux City, Ia., has decided to open this track officially July 4 with a 300-mile race, for which a purse of \$25,000 has been hung up. The event will be a class E non-stock race, open to cars with piston displacement of 450 cubic inches or less, and minimum weight of 1600 pounds. The purse is to be divided as follows: First, \$10,000; second, \$5000; third, \$2500; fourth, \$1750; fifth, \$1500; sixth, \$1100; seventh, \$900; eighth, \$800; ninth, \$750; 10th, \$700.

E. R. Schulz, secretary of the Sioux City Automobile Club and the Speedway Association, is manager of the meet. The track and grounds

are located to picturesque advantage just outside the city, and the surface is of dirt, of a character that packs hard when oiled.

The three Maxwell cars entered for the fourth annual international sweepstakes 500-mile race in Indianapolis, Memorial Day, will be equipped with Miller tires, made by the Miller Rubber Company, Akron, O.

In addition to the special Bosch awards already announced for the 500-mile race in Indianapolis this month, the Bosch Magneto Company, New York City, has offered an additional prize of \$500 to the winner, providing the record of 78.72 miles an hour for the race, established by the National car in 1912, is exceeded. This prize is conditional upon the use of Bosch products.



Earl Cooper (in Car) and Barney Oldfield, Two Members of the Stutz Racing Team in 500-Mile Race.

per; Sunbeam, Jean Chassagne; Sunbeam, Harry Grant; Marmon, Joseph Dawson; Beaver Bullet, Charles Keene; Gray Fox, Howard Wilcox; King, Arthur Klein; Stafford, Jesse Callahan; Metropol, Joseph Horan; Maxwell, William Carlson; Maxwell, Teddy Tetzlaff; Maxwell, unnamed; Great Western, John Jenkins; Great Western, Ray Price; Great Western, unnamed; Tulsa, George Clark; Pope Bullet, Mortimer Roberts; Keeton, Louis Chevrolet; Bugatti, Friedrich; Bull Dog, William Chandler; Washington, Melvin Stringer; Dusenber, Richenbacher; Dusenber, unnamed; Mason, Mason; Tatter, Mazzucco; Titz, unnamed; Ray, S. F. Brock; Isotta, Marquise; Rayfield, Hugh Hughes.

Of these cars, the Peugeot and Delage are made in France, the Mercedes and Bugatti in Germany, the Excelsior and Sunbeam in England, and the Isotta in Italy. The others are of American manufacture, although a large number of them are not standard productions.

The speedway management has announced that all competing cars are expected to be on the track not later than May 20, with the purpose of

GENERAL NEWS OF THE INDUSTRY.

New Rates on Liability and Property Damage Insurance Show Material Increase for Commercial Motor Vehicles--Building Plans of Manufacturing Concerns, Etc.

AUTOMOBILE liability rates have been re-adjusted, effective on and after May 1, the change as applying to the New York district not materially affecting private pleasure cars, except in that new rates have been created for public liability only at \$2.50 less than the old, which continue for public and employers' liability. New rates also have been created covering public, employers and compensation under the workman's compensation laws of any state at \$7.50 over the old rates.

The principal change in the new schedule is in the rates for commercial automobiles, which have been advanced 20 to 40 per cent., with a corresponding increase in the cost for property damage coverage. The following table affords a comparison under the various classifications:

	Liability		Property Damage	
	Old	New	Old	New
Class 1.....	\$175	\$250	\$70	\$100
Class 2.....	150	200	60	80
Class 3.....	125	150	50	60
Class 4.....	90	125	36	50
Class 5.....	70	100	28	40

The new rates on these cars for liability are for public liability only, there being an additional charge of \$3.50 and \$5 for the employers' liability, whereas the old rates included both hazards. The classifications are as follows:

Class 1—Baggage transfer, electric light companies, express companies, mail wagons, newspaper delivery, police patrol, street railway companies, telephone and telegraph companies.

Class 2—Boiler dealers or makers, invalid carriages, iron and steel, junk dealers, machinery dealers, railway iron.

Class 3—Bottlers, brewers, department stores, dry goods stores, furniture moving, liquor dealers, news companies, oil distributing companies, parcel delivery, parcel post, safe movers and manufacturers, truck men, warehouse and storage automobiles.

Class 4—Barrel and box manufacturers or dealers, building material merchants, carpenters, cleaners and dyers, coal dealers, contractors, feed and grain dealers, furniture dealers, gas and water mains, ice cream dealers, ice dealers, laundries, lumber dealers, masons' materials, mineral water dealers, piano movers and dealers.

Class 5—Vacuum cleaning automobiles—all commercial automobiles not otherwise classified.

ADOPTS REFINANCING PLAN.

Stockholders of Kelly-Springfield Tire Company Re-Elect Old Directors.

The refinancing plan of the Kelly-Springfield Tire Company, which was presented in more or

less detail in the last issue of The Automobile Journal, was approved by the stockholders at the meeting held May 4, a total of 44,000 of the 51,000 shares being in its favor. Objection was made by A. M. Polack, but only about 1000 shares were voted against the plan.

The stockholders also re-elected the old board of directors, as follows: Van A. Cartmell, president of the company; F. A. Seaman, Austin Poole, Stephen Peabody, Gustave Maas, A. J. Scheuer and J. Oppenheim.

LOCATES IN OHIO.

Midgley Tire & Rubber Company Secures Factory Building in Lancaster.

Word comes from Lancaster, O., that Thomas Midgley, inventor of the Midgley tire, which has been the subject of some little patent litigation in recent years, is to supervise a plant for the manufacture of this product in that city. He formerly was identified with the Hartford Rubber Works Company, Hartford, Conn., now a constituent of the United States Tire Company.

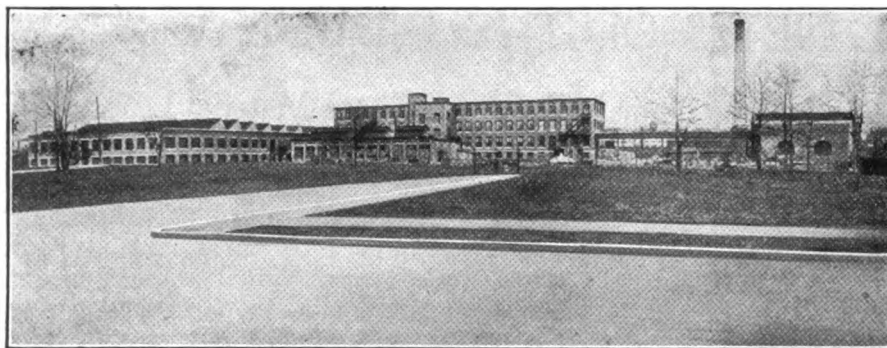
It appears that the Midgley Tire & Rubber Company has been organized by Harry Davis of Pittsburg, Penn., who acquired the patent rights during the time they were the subject of court action. He will be president and Midgley vice president. This concern is understood to have acquired the works of the Ohio Flint Glass Company in Lancaster, where the tires will be made.

SALE HELD IN ABEYANCE.

Bid of \$69,500 for the Assets of the Herreshoff Motor Company Unsatisfactory.

The Lycoming Foundry & Machine Company, Williamsport, Penn., was the highest bidder with an offer of \$69,500 for the entire property of the Herreshoff Motor Company, Detroit, at the receiver's sale in the latter city, May 1. The real estate and buildings were appraised at \$98,000 and the other property at \$40,000, a total of \$138,000. The Lycoming company is the largest creditor.

Referee Lee Joslyn has declined to confirm



Front View of the New Plant of the Weed Chain Tire Grip Company, Located at Bridgeport, Conn.

the sale, and has set a further hearing on the matter for May 14. The Detroit Trust Company, receiver, considers the amount low, in view of the appraisal value.

FORD ELECTRIC CAR.

Company Said to Be Seeking Opportunity to Secure Factory for Its Manufacture.

According to a dispatch from Detroit, those interested in the manufacture of the new Ford electric car are negotiating for the purchase of a plant. Options are said to have been secured on the property owned by the Chevrolet Motor Company, across Woodward avenue from the factory of the Ford Motor Company in that city, and also on a tract on the same side of the street.

TO MAKE KNUTSON STARTER.

Automatic Devices Company Contracts with Galesburg Concern for Its Manufacture.

The Automatic Devices Company, Galesburg, Ill., owner of the patents for the Knutson automatic engine starter for automobiles, has contracted with the Frost Manufacturing Company of that city for the production of 6000 of these starters, to be made in various sizes. The device is the invention of A. W. Knutson of Galesburg, who has been working on it for a number of years. It was thought at one time that it would be placed on the market last year, but it was decided to make certain improvements, which have now been completed.

The Knutson is operated by a spiral spring within a casing, and is said to have demonstrated its practicability in every way on several cars during the past winter. The officers of the company are: President, F. N. Clark; vice president, R. C. Wharff; secretary, E. P. Roberts; treasurer, E. M. Wharff; directors, the above and C. F. Hurburgh, H. A. Niven

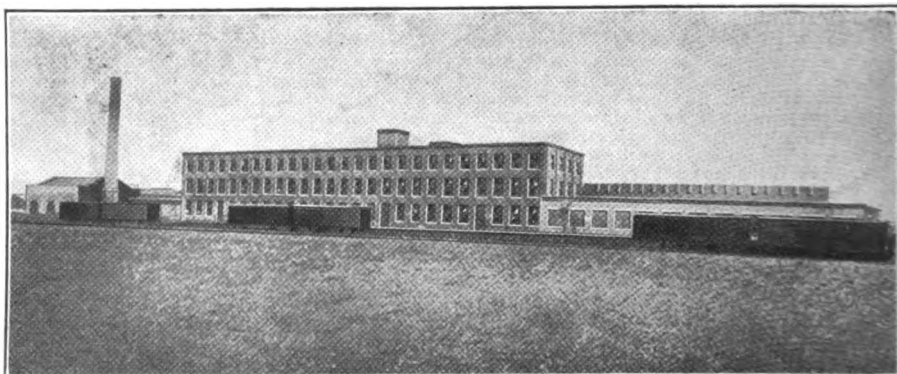
and A. W. Knutson. As a result of the contract with the Frost concern, it is stated that considerable new machinery will be installed and that the manufacturing facilities will be increased materially in the immediate future.

OCCUPIES NEW FACTORY.

Weed Chain Tire Grip Company Removes to Bridgeport from New York City.

Accompanying illustrations show the general exterior appearance of the new factory of the Weed Chain Tire Grip Company, Bridgeport, Conn., to which the offices of the company were removed from 28 Moore street, New York City, the first of the month. This means that all branches of the concern's business will be consolidated at this point.

The factory is admirably well situated to meet the needs of production and shipment, and the buildings are equipped throughout with the latest machinery. It is stated that the demand for Weed tire chains has now reached the point where it is necessary to produce 60 miles of chain daily, and this was borne in mind when the new plant was designed and constructed.



The New Weed Tire Chain Factory as Seen from the Rear, Showing the Railroad Siding.

ASSUMES ADDITIONAL DUTIES.

Frank J. Mooney Also Becomes Sales Manager Upon Retirement of R. G. Neighbors.

President J. Walter Drake of the Hupp Motor Car Company, Detroit, announces that Sales Manager R. G. Neighbors has relinquished that position after several seasons of successful executive work, to enter another field. He will be succeeded by Frank J. Mooney, who has been advertising manager of the company for a number of years, and who will head both departments.

Mr. Mooney laid the foundation for his business career at Harvard, where he specialized in English and psychology. After taking his degree he went into newspaper work and was later initiated into the technique of practical advertising under the guidance of T. F. MacManus, well known as an automobile copy writer and advertising counsel. Mr. Mooney entered the motor car industry as advertising manager for the Anderson Electric Car Company, maker of the Detroit electric.

About four years ago the Hupp Motor Car Company needed the services of an expert in organizing its advertising department, and Mr. Mooney was selected. After completing this work he was appointed advertising manager, in which position he has succeeded in developing Hupmobile business, from a comparatively modest product to a point where the annual output is some 15,000 cars, including an export demand of surprisingly large proportions.

ENTERS BRITISH FIELD

Curtis Goes Abroad for General Vehicle Company and Is Succeeded by Fenner.

E. W. Curtis, Jr., has resigned as metropolitan district manager for the General Vehicle Company, Long Island City, N. Y., maker of G. V. electric and G. V. Mercedes gasoline trucks, and is at present on a three months' business stay in England, where he will establish British branches of the company. The interest in electric vehicles, which was awakened in Great Britain as a result of last year's visit of members of the Institution of Automobile Engineers to this

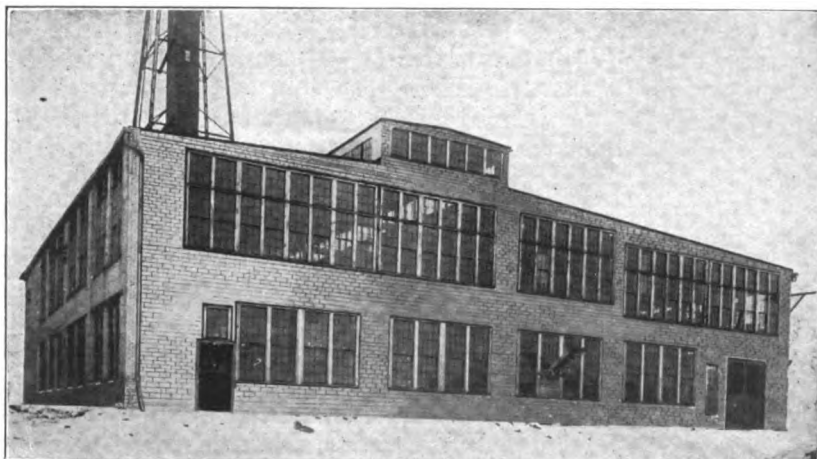
country, is believed to have reached a point where it will prove desirable to introduce vehicles of American make.

Mr. Curtis is succeeded in his New York position by David C. Fenner, who has been prominently identified with the motor truck trade in that centre for a number of years. At one time he was sales manager for the United States Motor Company, and later metropolitan sales manager for the International Motor Company.

NEW KISSELKAR PLANT.

Production Work of the Company Will Again Be Consolidated at Hartford, Wis.

According to information from Milwaukee, Wis., the Westinghouse Lamp Company of New



One of the New Factory Buildings Recently Completed by Kissel Motor Car Company, Hartford, Wis.

York City has made arrangements to take over the former Romadka trunk works in Milwaukee for its western branch factory. This building has been occupied for some two years as a branch plant by the Kissel Motor Car Company, Hartford, Wis.

The latter company has recently completed 60,000 square feet of additions to its Hartford plant, one of which buildings is shown in an accompanying illustration. This will afford opportunity for consolidating the business of this concern at the main works.

The Kissel company entered the automobile industry in a building 50 by 100 feet eight years ago. Today, with the completion of the additions mentioned, it has one of the best equipped plants in the country, where three KisselKar pleasure car models and six types of KisselKar trucks are produced.

KNOX PLANT IS SOLD.

Purchased by Mayo Estate, and There Will Be No Immediate Changes in Plans.

After adjournment from April 24 to April 29, the plant of the Knox Automobile Company, Springfield, Mass., was bid in by Edward O. Sutton, on behalf of the Alfred N. Mayo estate, for \$631,090, at the bankruptcy sale. It is stated that the business will be continued as a going concern, and that there will be no change in production plans for Knox passenger cars and fire apparatus and the Knox-Martin tractor.

On the first date three pieces of real estate, dwelling house property, were bid in by individuals for \$5855, these being subject to encumbrances totalling \$7400. Mr. Sutton's original bid was \$350,000 for the remaining parcels, including the factory, machinery and material in process. At the adjourned sale this figure was increased to \$631,090 for the entire property, it being stipulated that the three pieces of real estate would be turned over to the highest bidders of the previous date at the figures stated in those bids.

The appraisal of the property, made some time ago, placed its valuation at \$1,600,000. The claims of the heirs of the late president, Alfred N. Mayo, are said to aggregate about \$1,000,000.

ADOPTS NEW NAME.

Maker of Titan Storage Batteries Now Making Shipments from Newark Plant.

Announcement is made by the Baltimore Electric Storage Battery Company, Baltimore, Md., that the name of the concern has been changed to the Titan Storage Battery Company. It also has secured new quarters at Chapel street and Lister avenue, Newark, N. J., where the offices of the company have been established for some time, and manufacturing equipment is now being installed. Shipments of Titan vehicle batteries (Plante type) and lighting, ignition and starting batteries from the new location already have been begun.

The officers of the Titan Storage Battery Company are: President, Henry M. Keith; vice president, Daniel C. Spruance; treasurer, Edward S. Hyde; secretary, Henry H. Hanson; board of directors, the officers and Minor C. Keith and John G. Gray; general manager, Dr. W. E. Winship; sales manager, A. H. Mustard; superintendent, Eugene Handler. No change in

policy is contemplated, the control still remaining in the hands of Minor C. Keith, vice president of the United Fruit Company and president of the International Railways of Central America.

CLAIMS BASIC PATENT.

Standard Welding Company of Cleveland, O., Purchases Baker Invention.

As a further step in its effort to secure basic patents on the single-piece transverse split demountable rim, the Standard Welding Company, Cleveland, O., has purchased the patent No. 707,538, issued to John Baker, formerly of Meachem, Ill. This is held to cover the manufacture of an improved rim and felloe for rubber vehicle tires.

The claims of the patent are broad specifying that the object of the invention is to provide a rim that can be contracted to be inserted in an endless tire and then expanded to receive the tire, and be held in such expanded position by the felloe. Means are also provided for preventing lateral movement of the split ends of the rim.

SEMPLE RUBBER COMPANY.

New Concern in Trenton, N. J., Secures Plant for Manufacture of Inner Tubes.

The Semple Rubber Company has been organized in Trenton, N. J., with capital of \$125,000, for the manufacture of inner tubes. The plant formerly occupied by the American Porcelain Works in that city has been acquired and is now being overhauled and rearranged. It is expected that the installation of new machinery will be begun this week, and that production will be under way shortly.

The president of the new concern is C. H. Semple, who was at one time president of the G & J Tire Company, Indianapolis, Ind., and until about two years ago president of the Empire Tire Company, Trenton. F. A. Drake is treasurer and R. H. LaPorte, secretary. It is stated that the company expects to engage in the production of outer casings, perhaps later in the season.

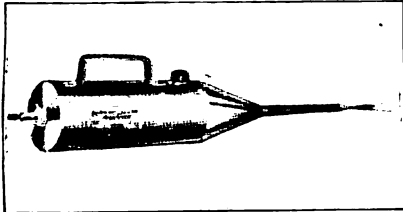
George S. Waite, sales manager of the Grant Motor Company, Findlay, O., maker of the Grant car, reports that carload shipments left the factory recently for Great Britain and Australia. Ten of these went to London and seven to San Francisco, en route to Australian points.

NEW ACCESSORIES FOR THE MOTORIST.

ROMORT ENGINE CLEANER.

Utilizes Kerosene in Form of Spray for Cleaning Motor, Etc.

The Romort Valve Company, 701 East Pike street, Seattle, Wash., is manufacturing the Romort engine



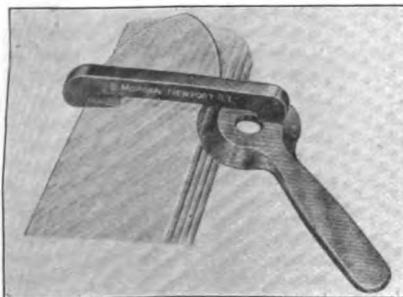
cleaner, which is designed especially for removing oil, grease and dirt from the motor and components of the chassis. The Romort is filled with two quarts of kerosene or gasoline, and air is supplied by a pump, compressor or tire power pump, a standard connection being provided. Turning a knurled rod opens a valve, permitting the fluid to be forced out in a very strong spray, which may be regulated as desired by the operator. The cleaner is equipped with a long spout, making it an easy task to reach parts not accessible by the usual cleaning methods. Being forced at a high pressure the spray removes deposits that would ordinarily require considerable labor to displace by the brush or rag treatment.

MORGAN SPRING OPENER.

Practical and Inexpensive Tool for Separating Leaves of Spring.

The Morgan Manufacturing Company, Newport, R. I., maker of tools, accessories, etc., for the motor car and repair shop, is marketing the Morgan rolling spring leaf opener, a simple and practical design in that it requires no adjustment. It is constructed especially for separating the leaves of a spring, permitting of cleaning and lubricating the bearing surfaces without jacking up the car.

As will be noted by the accompanying illustration, the device comes in two parts, one of which is provided with a chisel point. This is inserted between the leaves of the spring near the end and the edge of the rolling tool on the other side. Previous to this work the small bolts



are removed from the spring clip. By rolling toward the centre of the spring or towards the axle, the leaves will be separated easily and readily.

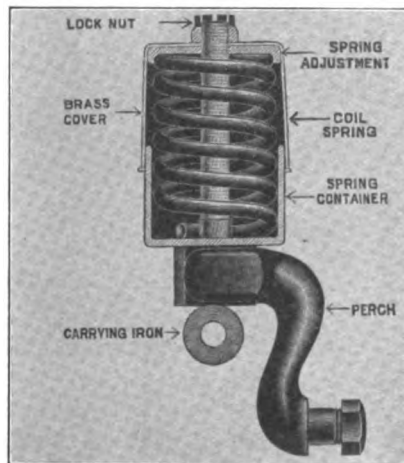
One of the qualities of the device is that it is manufactured in various sizes, these ranging from that adapted to a cyclecar to that for a locomotive.

ELK SHOCK ABSORBER.

Specially Designed for Ford Cars and Is Adjustable.

The Ely shock absorbers for Ford cars are marketed by the Donnelly Motor Equipment Company, 1785 Broadway, New York City, and come in sets of two and four, being adapted to both the front and rear springs. One of their qualities is that they eliminate the disagreeable vibration when traversing pavements, as well as take care of heavier shocks when operating on rough highways, etc. Another feature of the Ely is that provision is made for adjusting the tension of the coil spring to conform to the varying weight of the equipment, passengers, etc.

As will be noted by an accompany-



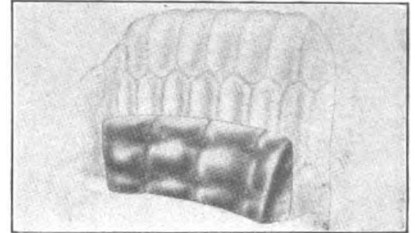
ing illustration, the design is of simple construction and is one that should make for efficiency and durability. It comprises a coil spring of a high grade, tempered steel; a carrying iron and a perch. The spring is contained within a brass cover, which is made oil tight in case the use of lubricant is desired. The principle of the Ely absorber is a spiral auxiliary spring providing a pivot point suspension.

The absorbers are easily fitted, the maker stating that any owner can attach them in a few minutes. They are made for both the front and rear springs, and are guaranteed against imperfection of workmanship and material for one year. They come finished in specially prepared black rubber and the selling proposition is an interesting one, both to the trade and purchaser. Being constructed to eliminate minute vibration, as well as shocks, they save tires and the car mechanism from undesirable stresses.

EASYBAK CUSHION.

Supports the Back, Contributing to Comfort When Driving.

The Holden Manufacturing Company, St. Paul, Minn., is marketing the Easybak cushion, which is con-



structed to support the back, thereby eliminating the strain upon the muscles when operating the clutch and brake pedals. The device is also of value to other occupants of the car. The Easybak fills the vacant space and, supporting as it does the entire back, permits one to sit with the muscles relaxed. It is made of a strong water proof fabric in a dark gray or subdued brown to match the slip covers, and in imitation or genuine leather. It is stated that the design will fit all makes of cars.

DANN SPRING INSERT.

Forms Oil Cushion as Well as Provides Constant Lubrication.

The Dann Oil Cushion Spring Company, 2246 Indiana avenue, Chicago, is marketing the Dann oil cushion spring insert, which insures constant lubrication of the leaves. As will be noted by the accompanying illustration, the insert is provided with a large number of apertures, which are filled with a lubricant. Being inserted between the conventional leaves the latter are always lubricated, and one of the qualities of the design emphasized is that the insert will provide lubrication for a considerable period.

It is pointed out by the maker that an ordinary spring having a number of leaves of graduated lengths contains an enormous area of surfaces, which means considerable friction is present if the surfaces are not constantly lubricated. The Dann insert provides this desired lubrication, eliminating squeaks as well as minor vibrations. It is easily installed.



GRAND RAPIDS WORK BENCH.

Built for the Owner and Private Garage and Has a Vice.

The Grand Rapids Hand Screw Company, Grand Rapids, Mich., has brought out a work bench especially



adapted to the private garage and for the owner who does his own repairing. It is well constructed of wood and has drawers partitioned off for the storing of nuts, bolts, screws and small material. The top is of hard wood and is protected by galvanized iron. A continuous screw iron vise is part of the equipment.

The bench is 48 inches long, 24 wide and 36 high. At one end is attached a wire basket to hold waste, rags, sponges, etc. There is also an extension for tire repairing, and the bottom of the bench is fitted with a back rail for storing oil cans, etc.

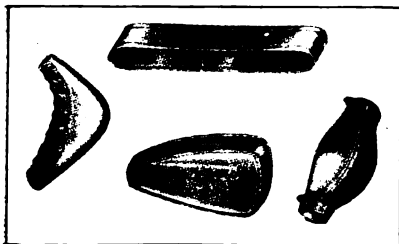
PERKINS CAMPBELL LINE.

Includes a Number of Specialties for the Ford Car.

The Perkins Campbell Company, 626 Broadway, Cincinnati, O., is manufacturing a number of specialties for Ford cars, these including the Latigo fan belt, steering gear boots, top rest, rebound straps, front license holder, spark plug case, hood strap, license and tire straps, starting crank holder, etc.

The Latigo fan belt shown herewith, is constructed of genuine Latigo leather, which contains no mineral or material employed in tanning. It is claimed to be the strongest leather known, and that it is impervious to the action of heat, oils or water. Special emphasis is laid upon its non-stretching qualities. It is also held to be unusually flexible.

The boots marketed by the company for the steering linkage of the Ford machine come three to a set. They are constructed of the best grade water proof leather, and are of the lace type. By packing these boots with grease the parts are assured of proper lubrication, and the covers also exclude road dust, which



is an abrasive. The entire set is inexpensive.

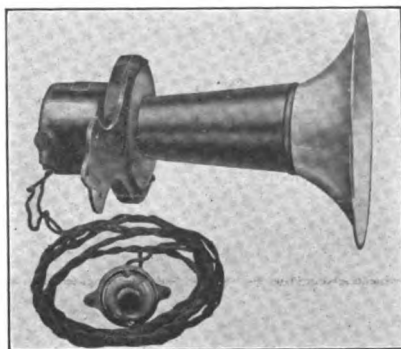
The Perkins Campbell Company is specializing on water proof seat covers and manufactures these for both the Ford touring and roadster models. The material employed is the best grade water proof cloth, which is cut over special patterns to insure an accurate fit. The maker states that the covers will not stretch or shrink. They are fitted by screw glove fasteners, and can be attached easily by the owner.

APOLLO ELECTRIC HORN.

A Moderately Priced Signal Manufactured in Two Sizes.

The Automobile Supply Manufacturing Company, Brooklyn, N. Y., is marketing a new design of electric horn termed the Apollo. It is a moderately priced signal, but the maker states that the same material and workmanship are incorporated as in the other products of the company. The tone is claimed to be far reaching, but free from harshness. The warning note is held to be specially adapted for city work.

The operating mechanism is stated to be so constructed that it will require no attention, and the horn is accompanied by a three years' guarantee. It comes in two sizes, the



model S having a five-inch bell and overall length of nine inches. Model L is 10 inches long and has a 7.25-inch bell. It comes complete with push button, cord, etc., and is held to be economical in current consumption.

DIMMING DEVICES.

The very general adoption of electric headlights is responsible for the appearance on the market of a number of devices to eliminate glaring effects. The inventors utilize various methods to accomplish their ends, these including electrical and mechanical, while others so frost the glass that the rays contributing to the glare are softened.

That much remains to be accomplished in perfecting a practical and efficient headlight glare remover is acknowledged by those who have made a study of the problem. It must be moderately priced, adaptable to both electric and gas lamps, and require no attention after installation. The proposed legislative action on glaring headlights indicates what may be expected in the near future.

STANDARD SIGNAL LAMP.

Warns Following Vehicle by Use of Colored Compartments.

The Standard Signal Lamp Company, Sanford building, Bridgeport, Conn., is manufacturing the Standard



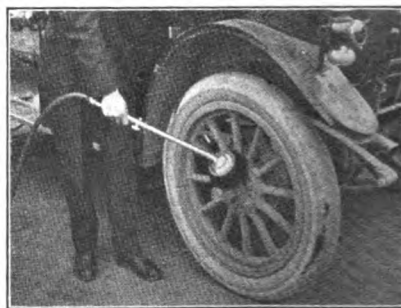
signal lamp, which is designed to notify cars approaching and travelling in the same direction the driver's intentions. It is a neat, semi-cylindrical housing of three compartments, each fitted with a tungsten bulb, controlled separately or in combination. The "Left" compartment is red; the "Stop" black and "Right" green. The different colors enable the driver of the following vehicle to distinguish the compartment more easily. The device also includes an electric tail light and a bracket for the number plate, which is lighted from the tail lamp.

HICKS FOUNTAIN BRUSH.

Has Long Handle and Adjustable Nozzle and Keeps Hands Dry.

The Howard W. Hicks Brush Company, 826 18th street, Denver, Col., is manufacturing the Hicks perfect fountain brush. It will appeal to owners who wash their cars, as by it the work may be performed without soiling the clothes or placing the hands in the water. The last named advantage makes for comfort when the machine is washed in cold weather and when the garage is not equipped with means for heating the water.

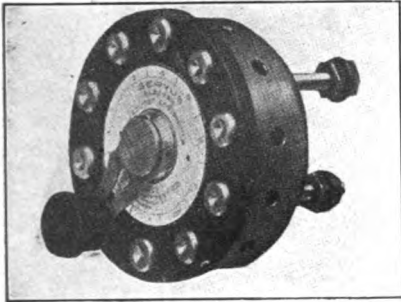
The brush parts are made of aluminum and the 18-inch handle is of nickelled steel, equipped with a rubber grip. The handle is provided with a standard connection permitting of screwing on the ordinary garden hose. The brush is also detachable. One of the qualities of the brush emphasized is that a rotatable water chamber prevents wear on one side. The handle is equipped with a cut-out, permitting control of flow of water as desired, making for economy.



SERVUS HEADLIGHT DIMMER.

Controls Lights from Dim to Bright and Extinguishes Them.

The Servus Equipment Company, Newark, N. J., is marketing the Servus headlight controller for cars



equipped with electric lighting. It is designed to enable the driver to dim, extinguish or brighten the lights without leaving the seat. The device comprises a coil of special resistance wire divided into 10 sections with contact points so arranged as to allow all, any part, or none of it to be brought into circuit. When the lever is placed on the "low" point the lights will burn dimly. Moving the lever to other points increases the strength of the current and proportionately. There is also an "off" position. The device is installed in place of the usual switch and the regular wires are utilized.

CLEAR AHEAD LAMP BRACKET.

Turns Headlights in Same Direction as Steering Wheel.

The disadvantages of the fixed type of headlights are well known to experienced drivers. Even when operating on a straight road the rays of light are not sufficiently deflected to enable a driver to note the condition of the thoroughfare when turning out for an approaching vehicle. And in rounding curves, especially on unknown roads, the light does not illuminate the inside of the curve so as to reveal any possible obstructions that may exist.

The Auto Protector Company, 58 Tyler street, Springfield, Mass., has brought out the Clear Ahead lamp bracket, which is held to solve these problems, and one of the qualities of the design is that it can be attached without alterations. That shown in an accompanying illustration is the bracket made for the model T Ford



machine, and it will be noted that the lamps are turned at the same angle as the road wheels.

Both lamps turn to the right or left or in the same direction as the steering wheel, and the device is so made that the movement is accurate. When rounding a curve the inside light illuminates the sides of the road, while the other lamp lights the centre, thus making for safety.

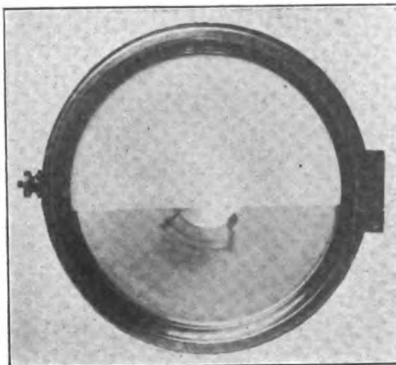
In addition to the Ford design the company manufactures an equipment for larger machines, a standard size. Both types are moderately priced.

MULCHAHEY DIMMER.

Eliminates Blinding Effect of Headlights by Novel Means.

One of the latest devices for eliminating the glare of the headlights is the invention of Howard F. Mulchahey, 8 Mt. Vernon street, Providence, R. I., and it is stated that it is adaptable to both electric and acetylene lamps. The dimmer or headlight ray controller, as it is termed by the maker, is obtained by treating the glass of the headlight by a special process.

The glass is treated to a point a little below its centre and while the frosting effect eliminates the glare,



it does not reduce the efficiency of the light, as the lower half is left untreated. Consequently the projecting rays are obtained, but the upward members are so softened that occupants of approaching vehicles, and pedestrians are not blinded.

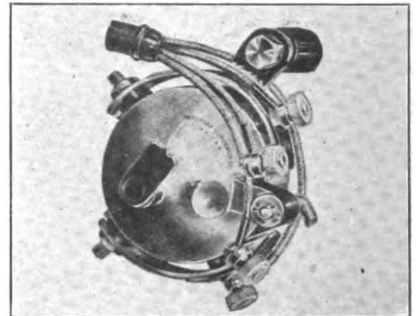
The maker states that he has given his dimmer severe road tests and that one can look into the lamp without any blinding effect, as the bright rays do not reach above the waist of an average sized person. It is also claimed that a better driving light is obtained, as the upward rays are softened, and this should prove of value when operating in foggy weather. One of the qualities of the process is that it is inexpensive, and that the regular glass can be treated or replaced by one of the Mulchahey design. Another feature is that after once fitting no attention is required, and the design is practical for city as well as country driving.

The editor wishes to acknowledge the receipt of descriptive matter from several makers which does not appear in this issue. It will be published in the May 25 issue.

PEDERSEN TERMINALS.

Attachment for Ford Timer Having Accessible Features.

The Pedersen Lubricator Company, 640 First avenue, New York City, maker of lubricating devices,



has brought out a new specialty for the model T Ford motor. It is a simple and inexpensive attachment for the commutator, consisting of two sheet metal stampings, which are utilized as false terminals. They are attached to the regular Ford timer terminals, but are insulated from the two upper ones by fibre strips.

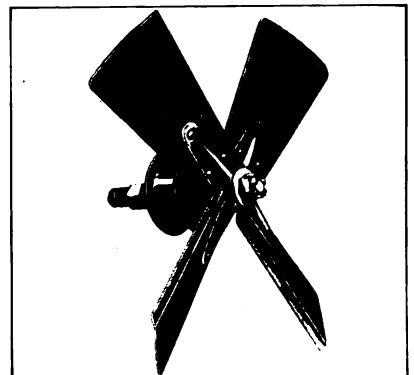
The function of the arrangement is to keep the two lower terminals and their primary wires away from the deteriorating effects of oil, etc., and the design makes it possible to reach the terminals easily when desired.

OAKES CYCLECAR FAN.

New Model is Light in Weight and Blades Have a Peculiar Flare.

The Oakes Company, Indianapolis, Ind., manufacturer of automobile parts and a specialist in radiator fans, has brought out a new design especially adapted for service on cyclecars. As shown by the accompanying illustration, the blades are set at an angle or pitch that has been found to be the most effective under actual tests.

One of the features of the new fan is the use of a peculiar flare on the side of the blades, which is held to be a practise in vogue abroad. The new model, although of light weight, has been constructed with the same high grade material and workmanship for which the products of the company are noted.



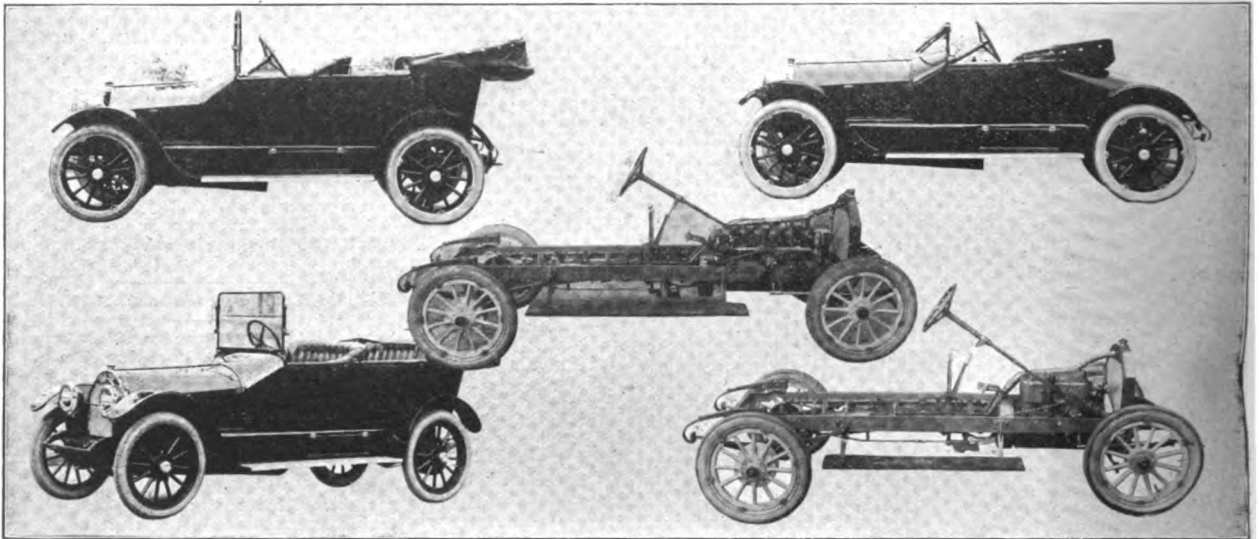
DETAILS OF NEW HERFF-BROOKS LINE.

ANNOUNCEMENT is made by the Herff-Brooks Corporation, Indianapolis, Ind., of two models for the present season. These comprise a four and a six-cylinder car, and one of the noticeable features of the latter is that it is the lowest priced six up to the present time. Outwardly the four and the six are practically the same, the only difference being in the power plant. The running gear of the four is the same design as the larger chassis, but smaller in proportion.

The Herff-Brooks line is sold with complete equipment, including the Jesco electric lighting and motor starting system, silk mohair top, rain vision windshield, speedometer, quick acting cur-

in its plant. The design of the crankshaft differs from conventional practise in the number of bearings employed, seven being utilized, and these are 1.75 inches in diameter. This provides ample bearing surface, and the company points out that excellent balance is obtained and that vibration is eliminated. The crankshaft is cut from a solid billet of steel and the bearing material is retained in steel caps. The connecting rod bearings are ample in size, being 1.375 inches.

The single camshaft runs on three plain bearings and actuates square pushrods, the last named members operating in similar shaped, lubricated guides. The valves are 1.875 inches in



Members of the Herff-Brooks Line, Including a Six-Cylinder and a Four-Cylinder Chassis to Which Touring and Roadster Types of Bodies Are Fitted—The Larger Car Is Held to Be the Lowest Price Six Marketed.

tains, extra demountable rim, speedometer light, dimming attachment for the headlights, top cover, robe and foot rails, tools, etc.

The bore and stroke of the six-cylinder motor is four by 4.5 inches, rated at 38.4 horsepower by the S. A. E. formula, but this is held to be very conservative. The cylinders are cast separately, and are of the L head type with the valves on the left. One of the features of the design is the method utilized to enclose the valve mechanism. As will be noted by an accompanying illustration, individual enclosures are employed. These are held to be proof against the entrance of road dust or other abrasive foreign elements, and to be easily removed and replaced.

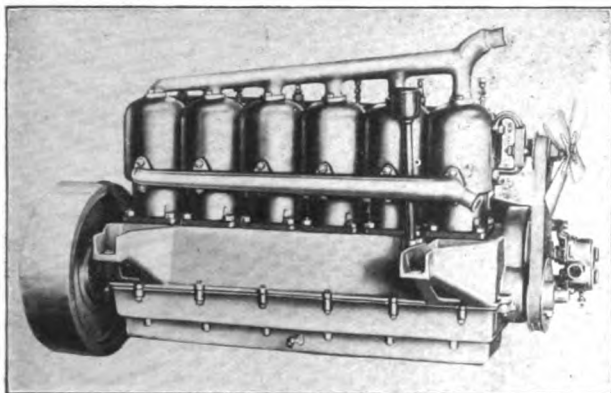
The company states that all of its parts, even such small material as studs, bolts, etc., are made

diameter and have a lift of .3125 inches. The normal compression of the motor is estimated at 65 pounds a square inch.

The carburetor is a Kingston, located on the left hand side of the motor, and ignition is by a magneto of the same make. The magneto is driven through a universal joint and the instrument is mounted on a crankcase platform. The location of the water pump is unusual, it being in front of the timing gearcase. Drive is through bronze gears. One of the qualities of the arrangement is the accessibility of these components and the ease with which they may be removed.

The lubrication is by a combined splash-pressure system in which the oil is taken by a pump with helical steel gears, actuated by the cam-

shaft, from the sump in the crankcase, forced through a strainer, thence to the dash sight feed. From the last named member the lubricant



Showing the Clean Right Hand Side of the Herff-Brooks Six-Cylinder Motor.

travels to individual troughs in the lower crankcase, into which the ends of the connecting rods dip. The rods are provided with spoons, and all bearings have oil grooves. The timing gears, which are helical steel members, are automatically lubricated. A four-point motor suspension is employed, the crankcase from which the supporting arms project being made of semi-steel.

The clutch is a leather faced inverted cone design, and a special chrome leather is utilized for a facing. Steel springs are employed to make for easy engagement. The design provides means for overcoming the inertia of the flywheel, a form of clutch stop being incorporated which makes it possible to change from one speed to another easily. It is stated that the clutch may be slipped without injury to the release collar.

The transmission is located amidships and provides the conventional three forward speeds and a reverse. The shafts run on ball bearings and gears are considered 50 per cent. oversize, cut from forged blanks, hardened by a special process. All gear centres are ground to insure alignment and the teeth of the main sliding members are faced off to provide easy meshing. The main shaft has four integral splines. Shifting is by heavy bronze forks operating on hardened steel shafts .75 inch in diameter.

Drive from the gearset to the rear axle is through a single universal joint, which has a hollow centre of sufficient grease capacity to insure ample lubrication for 5000 miles of service. The front end of the drive shaft is squared, as is the universal joint, eliminating the use of keys, etc. The drive shaft is enclosed, and its housing is bolted directly to the differential case, by long studs and double nuts.

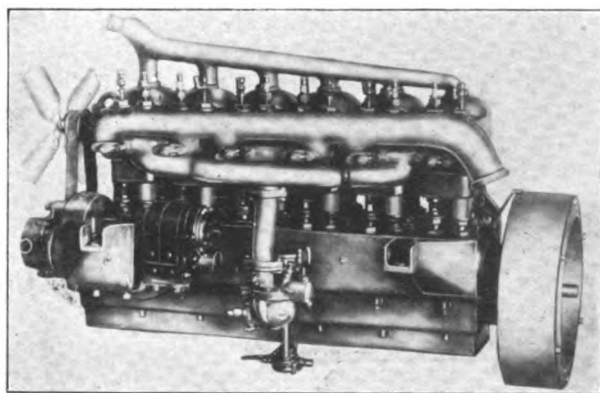
The rear axle is of the semi-floating type and extra heavy ball bearings are employed throughout. The differential has four pinions mounted on a drop forged spider, and all gears are constructed to withstand severe service. The bevel gear has 56 teeth, and adjustments are provided for changing the mesh of this gear with the pinion. The drive and axle shafts are of a high grade, special steel, 1.375 inches in diameter.

Drive is taken through the rear springs. These members are of the three-quarter elliptical design, very long, and held to be unusually flexible. All springs are provided with grease cups and the spring blocks on the rear axle turn. They are also lubricated.

Centre control is provided, with the driver placed at the right. A special lock is installed on the gearshift lever, preventing the possibility of changing from a direct speed into the reverse. Attention has been paid to accessibility of chassis components, the transmission and differential being provided with large inspection plates.

The matter of brakes has received careful consideration by the designer. Both sets are located on the rear wheel and are of the internal expanding type. The service is operated by pedal and the emergency by the usual hand lever. Both sets are equalized, the equalizers being supported on top of the differential housing and accessible.

As will be noted by an accompanying illustration, the right hand side of both motors is unusually clean. The steering column is set at a comfortable angle and the components of the steering gear and its linkage are ample in size, providing a large factor of safety. All wearing parts are adjustable and means are provided for



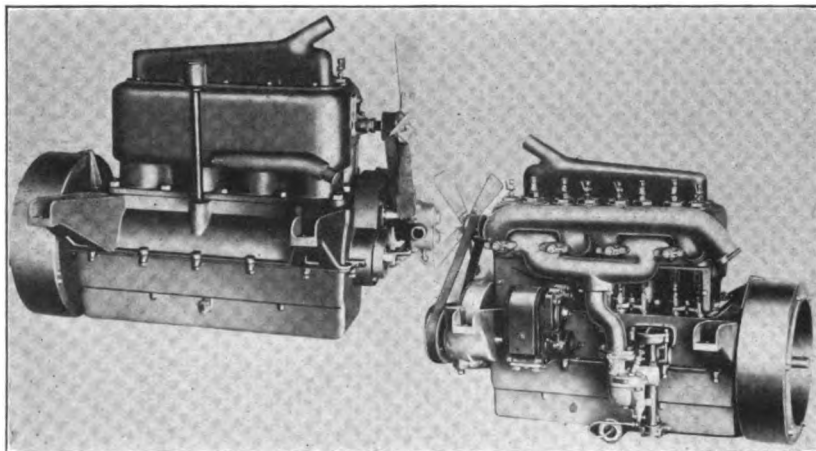
The Mounting of the Water Pump on the Herff-Brooks Six is in Front of the Timing Gearcase.

lubrication, grease cups being fitted.

The electric lighting and motor starting system is a Jesco, a unit, which is supported on a

heavy plate at one side of the transmission. The energy of the electric motor is imparted by silent chain to a gear bolted to the clutch sleeve in front of the gearset. The storage battery is supported in a special steel hanger at the rear of the chassis, where it is accessible by removing the floorboards. The wiring has been carefully executed and every precaution taken to prevent short circuits in the lighting, motor starting and ignition systems. The storage battery is of ample capacity.

The Herff-Brooks bodies are of very attractive design, having as they do long, sweeping curves, sloping cowl and a wide curve at the rear. They are a one-piece construction. The fenders follow the outline of the wheels closely, and are finished in baked-on enamel, as are the skirts and enclosed tool box. The members of the instrument board are finished in black and



Illustrating the Right and Left Hand Sides of the Herff-Brooks Four-Cylinder Motor.

nickel and all control units are very accessible to the driver.

The spare tire carriers are placed at the rear of the chassis, and the running boards, footboards, etc., are bound with aluminum. The upholstery is of the Turkish type, very deep and comfortable, as the cushions and backs are tilted. The back of the front seat is protected by a scuff pad. The wheels are heavy and are equipped with 34 by four-inch straight side Goodyear No-Rim-Cut tires and demountable rims.

The four-cylinder model differs slightly from the six. The motor is a block casting and the cylinders have a bore of 4.125 inches and a stroke of five, an L head construction. The same equipment as to carburetor and magneto is used and only in minor points does it differ from the six. The pushrod guides, for example, are retained in place in pairs by clamps.

SAFETY FIRST SOCIETY.

A Brief Statement as to the Objects of the Organization in New York City.

As stated in a recent issue of The Automobile Journal, the Safety First Society of Greater New York has been organized and the following officers have been elected: President, Ogden L. Mills; vice presidents, Jefferson De Mont Thompson, Ogden Mills Reid, Charles L. Bernheimer, Gen. Howard Carroll; treasurer, John K. Woodruff; general secretary, Frederick H. Elliott. On the executive committee are the following: Ralph Folks, secretary, Borough of Manhattan, chairman; Robert S. Binkerd, City Club; Harry A. Bullock, Brooklyn Rapid Transit Company; Mrs. Robert Francis Cartwright, New York City Federation of Women's Clubs; E. R. Hardy, Insurance Society of New York; P. J. Holdsworth, Mason-Seaman Transportation Company; George Keegan, New York Railways Company; R. W. Meade, Fifth Avenue Coach Company; J. A. Ritchies, Interborough Rapid Transit Company; Frank G. Webb, Long Island Automobile Club.

The organization is composed of a number of social, civic and commercial bodies, industrial and transportation companies, etc., with a view primarily to devising and perfecting ways and means for:

1—Lessening the number and degree of accidents occurring in the public street and elsewhere, and the economic waste they directly entail.

2—Minimizing, through more scientific planning of traffic routes and regulation of traffic movement, the great economic waste which, under present conditions, falls as a financial burden directly upon those using the public thoroughfares for the purpose of distribution.

3—Creating a medium for the exchange of ideas as well as for the co-operative effort of those most vitally concerned, financially and otherwise, in a solution of these problems.

What is believed to be the first order for a motor delivery car to be sent by wireless, was received recently by the Commerce Motor Car Company, Detroit, through its western sales manager, W. E. Kenyon, while at Seattle, Wash. The buyer, a department store at Friday Harbor, is located on an island at one of the extreme northwestern points of the United States. Five hours after the order had been transmitted to Detroit the car was en route.

SUGGESTIONS FOR THE NEW CAR OWNER.

Construction, Operation and Adjustment of Delco Ignition System Used on Buick Motors--Cleaning, Adjusting and Removing Premier Multiple Disc Clutch.

THE Buick-Delco system comprises a motor-generator and has the timer and distributor built in the forward end of the front housing.

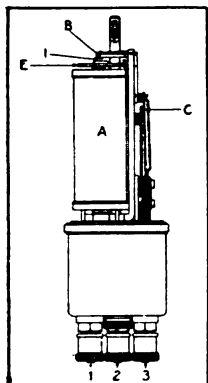


Fig. 1—Delco Ignition Relay.

These members are driven through a set of spiral gears attached to the armature shaft. Adjustment is also provided for the timer, the function of which is practically the same as the commutator used with battery and coil systems of ignition, to fix the proper interval of time between the sparks. As the primary circuit is broken the distributor makes a contact in the secondary circuit, timing the spark in the cylinder on compression.

The timer mechanism is shown at Fig. 2. It is located directly beneath the distributor head and rotor, and comprises a cam C, which has four so-called lobes or projections, one for each cylinder. Pivottally mounted is a lever or arm which is normally held in contact with the cam member by a spring. The last named part serves to keep the arm from making contact with the bottom contact member, as these points are supposed to touch only when a lobe depresses or moves downward or outward the movable arm. With the magneto type of ignition the spark occurs at the instant the contact points are opened. When dry cells are utilized the vibrating spark occurs when the contacts are opened, and this vibrating continues until the points touch.

Proper maintenance of the gap or break of the contact points is important. Provision is made for wear, etc., and when the contact arm of the timer is directly on top of a lobe of the cam, as indicated by the arrow at B, the distance should be .015 inch. When the lobe of the cam of the timer has broken contact with the arm member, the distance between the points should be about .01, as shown at E.

Adjusting Timer.

The cam C is mounted on the upper end of the shaft, which is adjustable. The timing may be varied by loosening the screw A in the centre shaft and rotating the cam in the desired direction, clockwise to advance and anti-clockwise to

retard. This screw must be tightened securely.

The shaft which transmits motion to the timer from the spiral gears is in the form of a tube, revolved by spiral gears. An inclined slot is cut through the wall of the hollow shaft, and a smaller shaft is carried inside the tube. A vertical slot is cut through the last named shaft. A pin, held by a collar, which is adapted to slide upon the outside of the hollow shaft, passes through the straight slot in the smaller shaft and the inclined slot in the hollow shaft. Obviously, if the collar holding this pin be moved along the hollow shaft it will change the angular relation to the smaller shaft, and this change in the relative position of the two shafts affects the advance of the spark timing. The spark position is governed by the spark lever on the steering wheel. Due to variations in the fuel and other conditions which cannot be held constant, exact settings of the spark lever cannot be given. These points can easily be determined by the owner after the car has been in service a short time.

Ignition Relay.

The ignition relay, which is incorporated in the dry cell circuit and which serves to break the primary circuit immediately after it is completed between the breaker arm of the timer, is shown at Fig. 1, with its components lettered. The

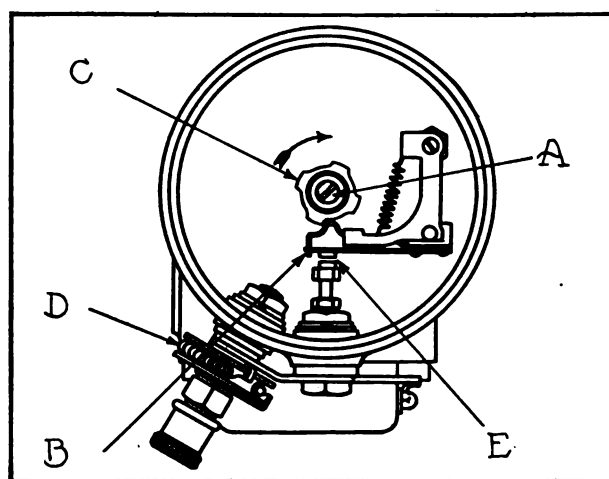


Fig. 2—Showing Components Utilised in Adjusting Delco Timer Employed on Buick Models 36 and 37.

function of the magnet A is to attract the armature B when the circuit is completed through the timer. This action opens the contacts C inter-

rupting the primary circuit. The magnet A has two windings, one of comparatively coarse wire and so connected that the current ceases to flow through it when the contacts C are open, and a winding of fine wire. The last named is connected around the contacts C in such manner as to hold the armature down after the circuit in the coarse wire winding is opened at contacts C. When the circuit in the fine wire is closed the making and breaking of the other by means of the contacts C results in a single spark at the plug, instead of a vibrating spark. This condition obtains when operating on dry cells, as the fine winding circuit being closed when the cam closes the contacts the vibrating spark is prevented until the points are separated.

The adjustment of the relay is at the pole piece E. This maintains the distance between the armature B and the pole piece E, and the

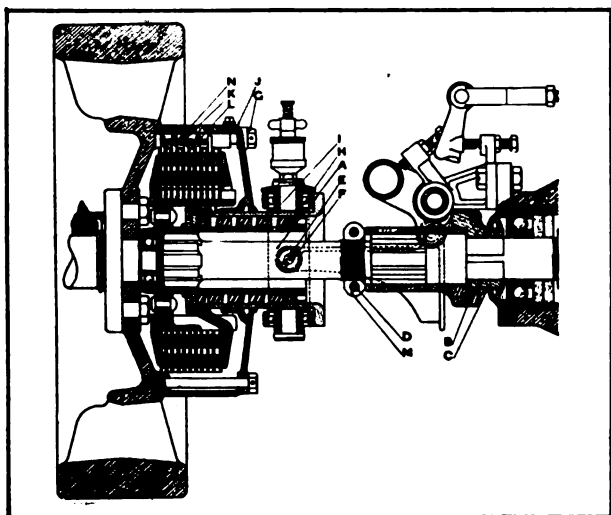


Fig. 3.—Sectional View of Clutch Assembly of Premier Car with Parts Used in Adjusting Lettered.

gap between the contacts C. Adjustment is made by turning the notched head clockwise (looking down upon it) to increase the gap, and vice versa to decrease the gap.

Adjusting Contacts.

The correct distance between the contacts C when the armature is pressed down on the pole piece E is equal approximately to the thickness of one sheet of ordinary catalogue paper. A simple way to make an adjustment is to run the motor on the dry cells. Turn the notched head of the pole piece E in an anti-clockwise direction until the motor stops firing. Then turn it four or five notches in the opposite direction. Under no conditions should the adjusting screws be turned very far in either direction.

If particles of dirt get between the armature and the pole piece at the point indicated at

I, they may be displaced by slipping a piece of smooth paper between the parts mentioned, pressing lightly upon the armature, and pulling out the paper, imparting a movement similar to utilizing a file.

If the armature vibrates rapidly when the ignition lever is in the battery position it indicates weak dry cells or dirt, either between the relay or timer points. The distributor requires no other attention except an occasional wiping of the contacts with a soft, smooth, oily rag, one free from lint. The head of the distributor may be removed by pressing back the metal tongue at the side, rotating the head anti-clockwise until the notch in the rim of the head coincides with the tongue, then lifting the head straight up. The rotor is removed by lifting in a similar manner, which will expose the timer mechanism.

PREMIER CLUTCH.

A knowledge of the construction and operation of the multiple disc type of clutch will be of distinct value to the new owner in cleaning and adjusting it when it needs attention. The following description of the clutch utilized on the series X Premier car will be of service in caring for similar designs.

The Premier clutch is shown at Fig. 3. It is of the multiple disc type, and operates in oil, being enclosed in a dust proof housing attached to the rear of the flywheel. Connection between the clutch and gearset is by means of a hardened floating shaft A, broached at its forward end to engage with the clutch, and having at the rear end a three-jawed coupling B, which engages with a similar part C on the transmission.

The sleeve B, which carries the coupling, slides upon the clutchshaft and may be easily slipped forward by removing the split clamp collar D. To remove the clutch, displace the floorboards and draw the cotter pins E from the .375-inch pins F in the pedal shaft end of the cradle. Remove the split nut D from the clutch shaft A, and slip forward the sleeve B (which connects with the transmission) so as to disengage it from the coupling C. Next, take out the eight .375-inch screws G in the clutch cover on the flywheel, which will permit of removing the clutch and shaft.

To disassemble the clutch, back off the clutch nut H, which will release the clutch spring I, and it may be lifted out. The spring nut H is not employed for making adjustments, as none is necessary. A spanner wrench or two .25-inch pins may be employed for backing off the clutch nut H.

The clutch cover J can be displaced upon removing the spring, and the small and large plates L and K will be found on the clutch plate holder. The plates should be taken off and thoroughly cleaned. If badly worn new ones should be substituted. The small plates L have lugs upon their inner edges, which engage on the spider, and the large plates K have their lugs on their outer edges, to fit into the grooves in the clutch cover.

In reassembling it is important that the lugs of the large discs are so arranged as to fit into alternate slots, thereby providing space between every other plate for the action of the small springs, which must be assembled so as to project toward the rear of the car. The last two springs are arranged so as to touch the inside of the clutch cover. When the clutch pedal is pushed forward the little springs N tend to force the plates K apart, giving quick action and eliminating dragging.

When replacing the clutch assembly utilize shellac under the clutch cover to insure an oil tight fit. Slide the clutch shaft A forward into the clutch until it strikes the bottom of its socket. Slide the sleeve B with the three-jawed coupling rearward into proper engagement with the coupling C on the transmission. Replace the split nut D, screwing it along the shaft until both the shaft and the sleeve are forced securely into place, then screw the nut forward .03125 inch to allow that much end play in the clutch shaft, and tighten the two screws securely.

The maker of the Premier recommends lubricating the clutch every 500 miles. This is accomplished by removing the filler plug and using a funnel to replenish the supply. If the clutch be suspected of chattering or harsh engagement, open the cut-out and make sure that all six cylinders are firing properly. If the fault continues, or if the clutch drags or does not release promptly, inject about a pint of kerosene, running the motor a few minutes with the clutch disengaged, and with the gears engaged. Remove the kerosene and refill with new, clean oil. The clutch linkage ought to be lubricated about every 100 miles and the grease cup just to the rear of the clutch housing turned down frequently. It is attention to seemingly minor details that obtains maximum efficiency at a minimum of upkeep.

E. C. Campbell of the California Corrugated Culvert Company, Los Angeles, reports that his concern has found that the use of Hupmobile cars by salesmen has effected a decided saving in transportation expenses over horses or trains.

COLORADO-TEXAS TOUR.

Motorists in Former State Leave Garden of the Gods May 4 for 2500-Mile Trip.

The tentative itinerary for the 2500-mile sociability run of Colorado motorists through Texas, Oklahoma and Kansas has been arranged by the following committee: W. L. Anderson and J. H. Jenkins, representing the Pueblo Commerce Club; V. M. Friar, Trinidad Chamber of Commerce; Charles E. Bruce, Manitou Springs Hot Iron Club, and Eric A. Swenson and A. W. Henderson, Colorado Springs Chamber of Commerce. The party assembled at the foot of Pikes Peak in the Garden of the Gods, May 4, and it is planned to devote three weeks to the tour. The route lies through the following towns:

Colorado—Colorado Springs, Fountain, Canon City, Florence, Pueblo, Walsenburg, Trinidad.

New Mexico—Raton, Des Moines, Clayton, Texline.

Texas—Dalhart, Channing, Amarillo, Claude, Goodnight, Clarendon, Memphis, Estelline, Childress, Quanah, Chillicothe, Vernon, Electra, Wichita Falls, Henrietta, Bellevue, Bowie, Sunset, Alvord, Decatur, Fort Worth, Dallas, Hillsboro, West, Waco, Temple, Georgetown, Austin, San Marcos, New Braunfels, San Antonio, Cuero, Victoria, Freeport, Galveston, Houston, Conroe, Huntsville, Madisonville, Centerville, Teague, Mexia, Corsicana, Waxachie, Dallas, McKinney, Sherman, Denison.

Oklahoma—Durant, Sulphur, Pauls, Valley Purgell, Norman, Oklahoma City, Guthrie, Perry, Ponca City.

Kansas—Arkansas City, Wichita, Newton, Hutchinson, Sterling, Ellinwood, Great Bend, Pawnee Rock, Larned, Kingsley, Dodge City, Cimarron, Garden City, Syracuse.

Colorado—Holly, Granada, Lamar, Las Animas, La Junta, Rocky Ford, Manzanola, Fowler, Pueblo, Trinidad, Canon City, Colorado Springs, Manitou.

OVERLAND NON-STOP RUN.

North Dakota Agent Takes Novel Means of Demonstrating Car During Local Fair.

During the progress of the midwinter fair held in Minot, N. D., recently, the Minot Auto Company, distributor in that city and vicinity for Overland cars, made by the Willys-Overland Company, Toledo, O., decided upon an interesting method of calling attention to this product. A model 79 Overland was started on the day the fair opened and took part in a non-stop run during the 129 hours the event was being held.

According to the report, no tool was used on the engine throughout the run. The statement continues that only eight pints of lubricating oil were necessary to keep the machine, not only in perfect running order, but under high speed, and less than a glass of water was evaporated from the radiator in keeping the motor cool.

WITH THE CYCLECAR MANUFACTURERS.

Plans Completed for First Run of New England Cyclecar Club---Big Race Meet Scheduled for July in Detroit---New Models Announced and Other Happenings.

PLANS are practically completed for the first annual run of the Cyclecar Club of New England, and the details that have been made public are sufficient to indicate that it will not only be the initial long distance test of these little machines in the East, but one that should go far toward demonstrating the practical efficiency of the type over New England roads. The event will be held May 30-31, leaving Boston the morning of the first day and spending the night in Springfield, with noon stop at Worcester. The second day will take the tourists to Hartford, and return to Boston by way of Willimantic.

This schedule evidently has been prepared with a view to providing exceptional opportunity for calling attention to the newest product

ning of May 30. It is probable that luncheon will be secured in Willimantic the second day. Nearly 40 of the little cars, representing at least nine different makers, will take the trip.

WOMAN SELLS ECONOMYCARS.

Miss Anna Sheely Claims the Honor of Being the First of Her Sex to Take Agency.

Miss Anna Sheely, proprietor of the Sheely Motor Car Company, Passaic, N. J., claims the honor of being the first woman in America to take the agency for a cyclecar. She represents the Economycar, made by the International Cyclecar Company, New York City, in the entire northern portion of New Jersey, and expects to place at least 500 of these machines this year.

Miss Sheely has been an automobile dealer and garage manager for about a year, taking over the business upon the death of her father. She is a young woman, about 20 years of age, and has no assistance in handling the big business of one of the finest garages in northern New Jersey. Already she has succeeded in placing nearly 100 Economycars with sub-agents throughout her territory, and has found it necessary to devote a large portion of her time in demonstrating cyclecars to prospective dealers and purchasers.

TWO NEW IMP MODELS.

Both Have Chain Drive, While One Utilizes a Four-Cylinder Water-Cooled Engine.

It now appears that the W. H. McIntyre Company, Auburn, Ind., which began the production of the Imp cyclecar under the name of the Imp Cyclecar Company, has decided to drop this designation and all correspondence is signed by the former concern, which has been engaged in the production of vehicles of all types for over 44 years.

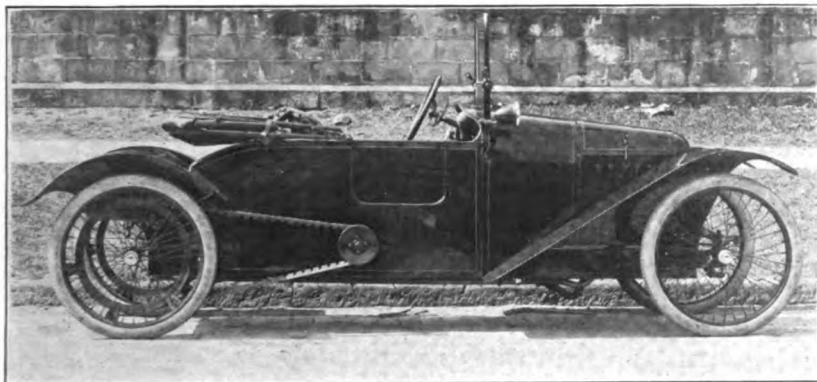
These little machines have been produced in quantity since September, and it is stated that something over 1200 have already left the Auburn plant. Until the present these have been fitted with a two-cylinder, air-cooled, V motor and long belt drive. Two new models have been



A Suggestion for Imp Owners During Coming Summer.

of the automobile industry. The total mileage is about 250. The first day's run to Springfield will be over good macadam roads, and this same condition will be met on the way to Hartford. After leaving Hartford, however, the macadam extends for a distance of about 10 miles only. Good gravel roads and some of telford construction are to be found on the way to Willimantic, and between that city and Boston there should be little difficulty in finding nearly every character of highway.

The social side of the event will not be neglected. Luncheon will be served at the Hotel Bancroft in Worcester, and a banquet will be held in the Hotel Kimball, Springfield, the eve-



The Mercury Monocar, the First Machine of This Type Produced in America.

announced, although complete details are yet lacking. It is stated, however, that they will not differ greatly in general appearance from the original Imp.

It is explained by the W. H. McIntyre Company that there has been some complaint regarding the belts, largely because it has been a little inconvenient to fit doors to the body. This is suggested, at least, as the reason for making a change to chain drive in the new models. One of these will utilize a two-cylinder, air-cooled V motor, while the other will be equipped with a four-cylinder, water-cooled unit. It is understood that both will have the motor in front, friction transmission and live rear axle, with chain drive.

MERCURY MONOCAR.

A Single-Seated Machine Which Is Expected to Make Its Appeal to Travelling Men.

The Mercury Cyclecar Company, Detroit, which is one of the concerns already making shipments of machines in carload lots, is the first in America to produce a monocar. This is a term applied abroad to cyclecars seating but one person. An accompanying illustration serves to amplify the definition.

According to Sales Manager R. C. Albertus, this type of body was designed to make a particular appeal to the travelling salesman. For that matter, all cyclecars are expected to have a wide sale among men representing commercial houses. However, it may be stated that the Mercury monocar possesses some additional advantages apart from the fact that it provides seating ca-

capacity for the driver only. The torpedo stern has a carrying space 26 by 22 inches, completely enclosed, in which the travelling man may stow away his sample case between stops.

The Mercury chassis already has been described in these columns. Briefly, it is fitted with a De Luxe twin-cylinder motor, friction transmission and V belt drive. The wheelbase is 100 inches, tread 36 and road clearance eight. The monocar weighs 600 pounds. Two other models

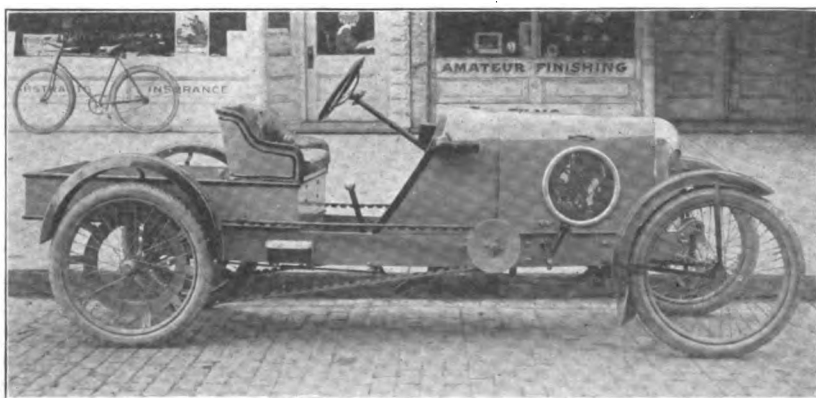
are supplied—a tandem passenger car and a light delivery wagon. The latter has an enclosed body with top and rear doors, behind the driver's seat, and its rated carrying capacity is 200 pounds.

THE DUDLY BUG.

Menominee Maker Also Fits Light Delivery Body to Passenger Car Chassis.

The Dudley Tool Company, Menominee, Mich., which is understood to be closely identified with the Menominee Electric Manufacturing Company, has been experimenting in the cyclecar field for the past two years. At first the plans called for the production of an electric machine, but later the secretary, W. J. Tideman, paid a visit to a number of foreign cyclecar factories, and it was decided to utilize a gasoline engine. The Dudley Bug is the result, and this is supplied either as a two-passenger car or a light delivery wagon, the latter of which is shown.

The two-cylinder, air-cooled engine has bore of 3.375 inches and stroke of 3.9, which is held to develop nine horsepower at 1200 revolutions a minute and 14 at 2200. The piston displacement,



Latest Type of Dudley Bug Chassis Fitted with Light Delivery Wagon Body.

69.9 cubic inches, places the machine in the true cyclecar division. Ignition is by the Atwater Kent Unisparker system, and the carburetor is a Schebler.

Power is delivered to the rear wheels by a planetary transmission, affording two forward speeds and reverse, and two non-stretching V belts. Springs are transverse semi-elliptic. Thermoid faced aluminum blocks forced into both rear pulleys by a lever afford the braking effort. Wheels are of wire, carrying 28 by three-inch tires.

The wheelbase is 96 inches, tread 40 and ground clearance nine. The passenger body is fitted with staggered seats, by which is meant that the front of the rear seat is flush with the rear of the driver's seat. This body is entirely replaced by the delivery wagon construction shown herewith.

The maker is also prepared to market a machine with rear seat across the entire back of the car, and driver's seat at right some little distance

mile handicap, classes B and C; five-mile international free-for-all, and 25-mile free-for-all. The first five events will be for stripped stock chassis only.

July 5—One mile, class A, three miles, class B, and five miles, class C, in all of which the cars will be required to carry the regular catalogue equipment and full number of passengers. Free-for-all novelty race, unknown distance, entrants being required to stop their motors in front of the grandstand, crank up and proceed once around the track, stop and drive backward half a lap. Also, 10-mile free-for-all handicap and five-mile handicap, classes A and B. The closing event of the meet will be a 50-mile Cyclecar Grand Prix, free-for-all.

STICKNEY MOTORETTE.

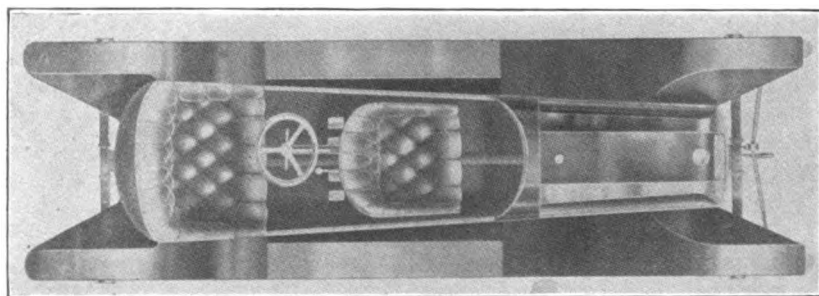
A Machine in the Light Car Division, Which Seats the Driver at the Rear.

While the Stickney Motorette is not strictly a new machine, it is of particular interest, from the fact that it is one of the few cyclecars which seat the driver at the rear, and also because it utilizes a four-cylinder motor of the pronounced long stroke type. The maker is the Charles A. Stickney Company, St. Paul, Minn., a concern which has had 15 years of experience in the manufacture of high grade products.

The dimensions of the motor are such as to place the machine in the light car division. The four cylinders are cast en bloc, with bore of 2.75 inches and stroke of five. The maker's rating is 12-15 horsepower. The thermo-siphon system of cooling is employed. Ignition is by Bosch magneto, and the carburetor is a Schebler.

A friction disc on the propeller shaft works against a fibre wheel on the jackshaft, which is equipped with a bevel compensating gear, and final drive to the rear wheels is by double side chain. Crosswise double semi-elliptical springs, 33.5 inches long and 1.75 inches wide are fitted both front and rear. The wheels are of wire, interchangeable, mounted on ball bearing hubs, and carrying 28 by three-inch tires.

An accompanying illustration shows the seating arrangement, and it will be noted that the driver is placed at the rear. The front seat is 18 inches wide and the rear, 24 inches. The former is made easily removable, and a special delivery body is supplied to take its place. The picture also shows the hand speed change lever in the centre of the car, and the four pedals, one for the service brake, a second for the emergency member and the two others to control the clutch spring. Spark and throttle levers are on the steering column. The wheelbase is 120 inches, the tread 40 and the ground clearance 9.5.



Top View of Stickney Motorette, Showing the Seating Plan and Arrangement of Controls.

forward. It is not just clear whether or not this is designed to accommodate three passengers.

FIRST BIG RACE MEET.

To Be Held in Connection with International Exhibition in Detroit, July 4-5.

The Cyclecar Exhibition Association, a New York City organization, is announcing plans for an international cyclecar exhibition and race meet on the state fair grounds, Detroit, July 4-5. The contests will take place on a dirt track and the cars will be divided into classes according to the definition of the Cyclecar Manufacturers' National Association as follows: A, 71 cubic inches piston displacement and less; B, 71-100 cubic inches; C, 100-125 cubic inches. The events will include:

July 4—Five miles, class A; two miles, class B; 10 miles, class C; five-mile handicap, classes A and B; 10-

THE ZIP IN CALIFORNIA.

Road Ability of Iowa Product Again Demonstrated by Two Long Distance Trips.

Two recent trips made by the Zip cyclecar, the production of the Zip Cyclecar Company, Davenport, Ia., in California, have served still further to prove the ability of this machine to travel long distances. Easter Sunday a Zip left Los Angeles for San Diego, where it was delivered to the agent in that city and vicinity. The inland route between these two cities covers about 180 miles, and only five gallons of gasoline were consumed en route. The speed limit was maintained on all roads, this being 12 miles an hour in the cities and 30 in the open country.

Fred S. Deister, manager of the Standard Cyclecar Company, Los Angeles, who is handling the Zip, recently had occasion to take a business trip to San Bernardino, a distance of 84 miles. Of course he used the cyclecar, and on account of the numerous stops on the way, the running time was slow. The return trip was made in the night and the 84 miles between the two cities was covered in 3.5 hours.

Cyclecars are becoming very popular in California. Fuel sells at 14.5 cents a gallon, and it has been demonstrated that these little machines will average about 40 miles to the gallon on the excellent oiled roads. This is said to mean that a trip of 100 miles can be made at a cost of about 35 cents for oil and gasoline.

SOME RECENT ANNOUNCEMENTS.

The Lulu, the Monmouth, the Wichita and One That Still Is Nameless.

The Kearns Motor Truck Company, Beavertown, Penn., announces the Lulu cyclecar, which seats two persons side by side. The motor is a four-cylinder, water-cooled unit; transmission, three-speed selective; final drive by shaft and the rear axle is with differential. The motor, clutch and transmission are mounted as a unit. The driver is located at the left, with centre control.

The Brown Cyclecar Company, Asbury Park, N. J., states that it will begin deliveries of its Monmouth raceabout model in July. It will have a wheelbase of 100 inches and tread of 52. The motor is to be a four-cylinder, water-cooled unit, rated at 20 horsepower. A cone clutch, sliding gear transmission and shaft drive are other details of construction. The wire wheels will carry 30 by three-inch tires.

The Wichita Falls Motor Company, Wichita Falls, Tex., is producing the Wichita, a tandem seater, designed by Eino Salimen. It utilizes a two-cylinder, air-cooled motor and belt drive, but no information has been received as to its other details.

W. H. Radford, formerly chief engineer for the Warren Motor Car Company, Detroit, is said to have interested New York City capital in the production of a new machine in the former city. This will have wheelbase of 100 inches and standard tread. The water-cooled motor will have four cylinders with bore of 2.875 inches and stroke of four. A three-speed selective gear-set is to be located on the rear axle.

CONTEST MANAGEMENT.

Thirty-Eight Cyclecar Manufacturers Indorse Proposition for Independent Control.

While both the American Automobile Association and the Federation of American Motorcyclists have sought to take charge of the cyclecar contests to be held this year, cyclecar clubs throughout the country have been energetic in their efforts to secure control of such events through the Cyclecar Association of America. In this work they appear to have the support of a large number of the manufacturers, 38 of whom have signed a resolution to this effect. The concerns which have expressed their approval of the plan are the following:

American Cyclecar Company, Seattle, Wash.; Joseph A. Anglada, New York City; Coey Motor Company, Chicago, Ill.; Comet Cyclecar Company, Indianapolis, Ind.; Continental Engineering Company, Chicago; Cresson-Morris Company, Philadelphia; Cricket Cyclecar Company, Detroit; Dayton Cyclecar Company, Joliet, Ill.; De Cross Car Company, Cincinnati, O.; Detroit Cyclecar Company, Detroit; Downing Cyclecar Company, Detroit; Dudley Tool Company, Menominee, Mich.; Euclid Motor Car Company, New York City; Flagler Cyclecar Company, Chicago; W. S. Frazier & Co., Aurora, Ill.; Frederickson Patents Company, Chicago; Greyhound Cyclecar Company, Toledo, O.; Gadabout Motor Corporation, New York City; Hawkins Cyclecar Company, Xenia, O.; International Cyclecar Company, New York City; Malcolm Jones Cyclecar Company, Detroit; Keller Cyclecar Corp., Chicago; LaVigne Cyclecar Company, Detroit; L. A. Cyclecar Company, Buffalo, N. Y.; Roble Cyclecar Company, Detroit; Milwaukee Cyclecar Company, Milwaukee, Wis.; Frank H. Morse, Pittsburg, Penn.; O-We-Go Car Company, Owego, N. Y.; Pet Cyclecar Company, Detroit; Puritan Motor Company, Chicago; Rex Moyer Company, Wyandotte, Mich.; Twombly Car Corporation, New York City; Valley Boat & Engine Company, Saginaw, Mich.; Ward Cyclecar Company, Milwaukee, Wis.; White Manufacturing Company, Waterloo, Ia.; M. C. Whitmore Company, Dayton, O.; Zip Cyclecar Company, Davenport, Ia.; Woods Mobillette Company, Chicago.

The first use of a cyclecar for the delivery of mail has been made by Earl Stacey of Encanto, Cal., near San Diego, who has taken delivery of an Imp. with which to cover his four-mile route.

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UNIFORM LEGISLATION.

The action of the American Bar Association, in co-operating with the American Highway Association, by the creation of a joint committee to codify and revise existing road laws, and make recommendation of new ones, is of decided importance. In order to realize the benefits which may result from this careful consideration of the subject by men capable of giving it the best of thought and experience, motorists must do their full share in arousing public opinion.

The situation, at present, is somewhat analogous to that which presented itself at the time prominent citizens of the eastern states met last year as a commission to draft a uniform motoring law. The reception accorded the efforts of these men by such legislatures as have had opportunity to act upon the proposed bill, is not such as to inspire confidence in the minds of men who are willing to give freely of their time and labor in behalf of such movements.

The reason assigned by some of the legislators who refused to consider the proposed uniform motoring bill, was that it was prepared by a commission purporting to represent certain states, without having been legally created. It

does not seem probable that this position will be held by legislatures which will convene next January, because there is abundant opportunity to give the subject such consideration on the part of the people that their representatives may be led to take the view that the efforts of men of such prominence, in an attempt to benefit the public, shall not be set aside because of technicalities.

And, of course, the same condition applies to the work of the joint committee on uniform road laws. It is not to be presumed that any committee will evolve a perfect bill, but the result of their efforts, particularly when it is well established that this represents careful thought and much time and labor, is entitled to every consideration on the part of those who presume to represent the body politic.

WHAT HAS BEEN ACCOMPLISHED.

But mostly the automobile means freedom to us. We're no longer citizens of Homeburg, but of the congressional district. We're neighbors to towns we hadn't heard of 10 years ago, and the horizon nowadays for most of us is located at the end of a 10-gallon tank of gasoline. Why, in the old days you had to go 50 miles east and double back to get into the north part of our county, and more of us had crossed the ocean than had been to Pallsbury in the north tier of townships. Now, our commercial clubs meet together alternate months and about 17 babies in our town have proud grandparents up there.

—George Fitch in American Magazine.

What the automobile has done for Homeburg in George Fitch's story it has done for all the towns, large and small, throughout the country. The paragraph quoted above sums up the situation in a manner that leaves little room for improvement. Of course the statement, in itself, applies alone to passenger cars.

A notable tendency among manufacturers of accessories, parts and fittings this year is found in the provision of equipment for used cars, affording the owner of older models opportunity to secure the same measure of comfort and convenience that is presented in the latest productions. This has an important bearing on the life of machines, and indicates in a manner that cannot be misunderstood that the modern motor car is a creation that can be depended upon to give satisfactory service over an extended period. It also demonstrates that the present day purchaser is giving every consideration to maintenance, with a view to securing the utmost value from his machine.

CROSS COUNTRY RACING IN URUGUAY.

Johnson Martin Tells the Detailed Story of the Second Annual Raid Montevideo-Salto-Montevideo as Seen from the Driver's Seat in the Oakland Car.

BECAUSE of the time required for transmitting mails between Uruguay and the United States, this is the first opportunity which has presented itself for a complete account of the recent second annual "Raid (pronounced "Ride") Montevideo-Salto-Montevideo", a road race organized by Tribuna Popular, a newspaper in the first named city. The account is by Johnson Martin, who subsequently was to make new automobile history by taking the first car, a Buick, across the South American continent, and over the Andes mountains, and The Automobile Journal is indebted to the Pan American Union, Washington, D. C., for permission to present the information contained therein. The story should prove of exceptional interest to those who are by no means familiar with conditions in South America.

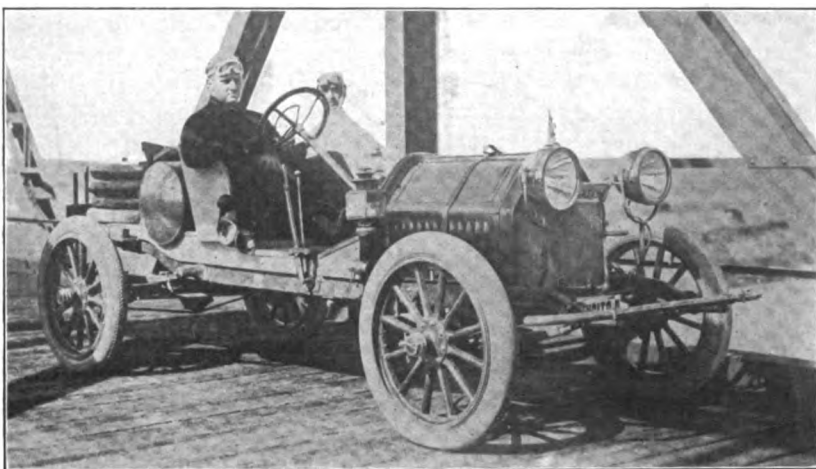
There were 18 cars entered, but after several days of hard rains, and because of the knowledge of the course gained from previous scouting trips, the majority of the European machines were withdrawn. At the start only seven contestants appeared—White, Case, Buick and two Oaklands, representing the United States; Vermorel, France, and Excelsior, Belgium. There were two classes, and but three cars finished. The Case proved a winner in the larger class, with Martin's Oakland in second place. The second Oakland took first prize in the smaller class. The distance was approximately 400 miles.

By Johnson Martin.

The first section of the race was over splendid macadam for some 28 miles, then good smooth roads for about 40 miles, then smooth with a few ditches for another 50, and thereafter long stretches of sandy desert tracks, rocky hill roads, very rough gravel and leagues of running through tall grass with mere parallel wheel tracks like narrow footpaths for guidance. Aside from one bridge over the Santa Lucia river, near Florida, and another at Duranzo, and the ferries at Dayman river and at Mercedes, all the rivers had to be forded by the competing cars. Most of

these are sandy bottoms, but the Salsipuedes (Get-out-if-you-can) is rocky and very dangerous to ford.

In the north, from Algorta to Paysandu, and between Paysandu and Salto, the turning point, there are enormous sand dunes, and between these the road leads among palm trees, very beautiful to contemplate, but a region very shy on water for hot radiators between rivers. Returning, the route leads through the Sierra de Mal Abrigo (Poor Shelter mountains), which is a range of hills of outcropping sand stone, presenting a most desolate appearance to the motorist from a height—nothing but rocks stretching away to the horizon with a sort of trail winding around through them, and in some places



Johnson Martin and His Oakland Car, on the Bridge Over the San Lucia River, Near Florida, Uruguay.

leading up over big flat rocks to avoid deep mud holes in the trail. There is also the Arroyo Negro (Black creek) to be crossed, and this is all that the name implies.

The Oakland 45, driven by the writer, with Otto Johanson as mechanic, formerly was fitted with a limousine body, but, in this race, was equipped with a torpedo body made in the General Motors Company's shops in Buenos Aires. It used a Splitdorf magneto. The Oakland 40 was entered as the Gladiator, by its owner, J. Felix Castillo of Montevideo. The White was a six-cylinder car, entered by Harold Reed, the South American representative of the White company. The Buick 16-B was driven by Alan



A Glimpse of the Grazing Country in the Interior of Uruguay, Divided into Estancias by Wire Fences.

Crocker. The Case was entered by the Case company.

Good Time on First Lap.

The first run to Canelones, over the fine road, was made by the White in 29 minutes, the Buick in 30, the Oakland in 31, the Gladiator in 38, the Case in 38 and the Vermorel in 61. The Excelsior stuck a cylinder and quit. The best time to Duranzo was made by the White, with the Oakland close behind. We started last and were second at Duranzo and at Paso de los Toros. We arrived at Paysandu third, two hours behind the Case, having changed and pumped up seven 920 by 120 tires, at 1:02 in the morning.

Taking the required 10 hours' rest at Paysandu, we used it for removing our front axle, which had collided with a big rock in the bottom of a stream we had been trying to dash through so as not to stick. This we straightened and replaced in time to leave on schedule at 11:02 in the morning, for Salto, where we arrived, after bursting two tubes, at 6:30.

So little happens at Salto that the town was wild and we were fairly mobbed while we filled our big tank with 30 gallons of gasoline and got some oil and some bottles of "pop" for use through the sandy desert on the way back. Soon after Florida we had hit a ditch at high speed and made a leak in our radiator. Although we carried a gasoline soldering iron, we did not care to take the time to make repairs, so carried a bucket of water in reserve and refilled at each brook and swamp hole.

Along the road to Salto during the afternoon we had stopped at a farm house, where we were regaled with a tumbler of "cana" or cane juice (pure alcohol), which proved far better

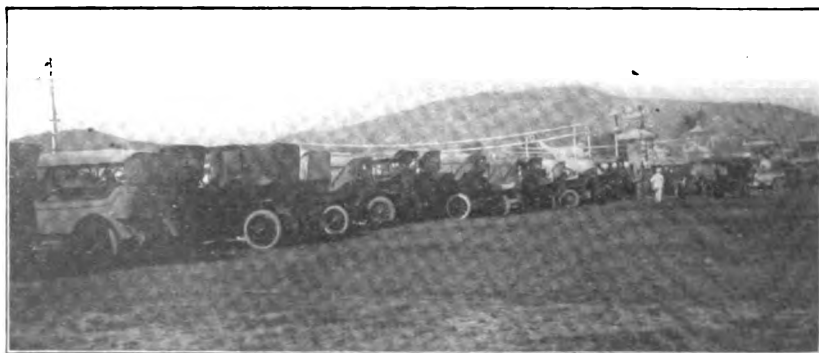
than tire irons in our tired state for removing a shoe. On the return trip we met the Buick crawling along with its clutch slipping, Crocker sleepily hanging onto a big strap tied around the clutch pedal, the mechanic driving and a pampa pilot or "baqueano" perched on the tire tank behind. They told us a story of the gross and inexcusable ignorance of their pilot, who had led them onto a wrong track and taken them into an

immense basin where they ran into a swamp and were only rescued by our same friend of the "cana" sending his boy on a pony to where he saw their big electric searchlight wobbling around in distress. They were in immediate need of water, and we gave them our reserve bucket, taking chances on reaching the next swamp hole.

On the Brink of a Ditch.

With our searchlight, we made very good running time, and at 1 in the morning arrived at the railway station of Quebrachio. These stations are like oases in the desert and are very welcome sights, especially when one is running at night in the big open. An hour after leaving this station our misfortunes began. Up to this time they had been merely nine tire changes.

We were making about 30 miles an hour when Johanson yelled to stop and flopped out over the steering wheel and over me, starting to pull me out as well. On examination we found we had run along the edge of a ditch six feet deep and 10 feet wide (like which we had passed thousands all day, caused by erosion in rainy seasons). It had not been noticed because we were sleepy, and it was just outside the lane of "white houses" which appear to line edges of the field illuminated by searchlight when one is sleepy.



Privately Owned Automobiles Assembled at Montevideo to Welcome the Oakland on Its Return Trip.

We found that our left front wheel was in the air over the edge of the ditch and could be turned by hand, the car resting on the front axle. The left rear wheel was still on the very edge, but the dirt was cracked under it and it would not stand reversing. We got out our 250 feet of one-inch manila rope, with two double blocks, and hooked onto a wire fence nearby. Luckily for us, all Uruguay is fenced into big fields for sheep and cattle raising.

We tied this wire around our rear axle, jacked up the left wheel, dug a trench outside of the right rear wheel, and by repeatedly tipping the jack over dragged the rear away from the edge. Then, cutting a track up the side of the ditch in front and cranking sharply to the left, Johanson down in the ditch in front holding his spade under the wheel and I sitting on the outside edge of the car with only my left leg inside on the clutch, we reversed and backed it up the little

Arroyo Negro called the Paso de la Cadena. Upon arrival we found nearly four feet of water and no oxen or horses to be hired. This was the place we made our fatal mistake. We should have waited a day if necessary and been towed through the river with our carburetor and magneto under our arms. Instead, we talked to an old wood chopper, who told us of the inevitable and invariable better crossing some distance above.

Haste Makes Waste.

We made off for this, crossing the Estancia Pons on the way. This estancia is one of the biggest ranches in Uruguay, and is where we stuck for three hours last year. The owner has a car and had made a bridge over the cattle wallow where we stuck, so we had no trouble, and joyfully made off through the tall pampas grass toward the ford, only to be brought rudely to our senses by sinking into a mire up to our axles. We



Men and Oxen from the Estancia House of Cambara Extricating the Car from the Marsh—Note Wire Fence Defining Estancia Boundary.

trench until it stood on solid, level ground, just as dawn broke.

After rushing the San Francisco river and the Chapicuy, and crawling through the wide and swift Queguay, we arrived back in Paysandu at 6:25 in the morning. From this point onward our trip is well described by the Tribuna Popular as a "Real Odyssey".

Leaving Paysandu we were unable to find anyone who knew the road beyond a league or so; they knew it led somewhere "para afuera" (outside), but all differed as to the proper route to the Arroyo Negro. We forded the Pantanoso river, the Rabon and the Celestino, then met a boy on horseback with an especially wide eyed stare, who seemed to have an honest countenance, but it was only his stare that was sincere, as it turned out.

He directed us back through these streams, to make a detour of 30 miles to a ford on the

should have doubled back along the ridge after crossing the little bridge, but instead we had cut right across in the direction of the spire of the chapel and grove of eucalyptus trees around the estancia house—a real residence.

As we did not appear one of the vaqueros (herdsmen) who had directed us to the little bridge galloped over the hill and tried to pull the Oakland out with his pony. Then he galloped off again and soon reappeared with two more ponies. On one was his young son and on the other, sitting crosswise, was his wife, with a four-year-old boy astride her hips, after the usual Indian fashion. Our friend explained that the men were busy and the wife had asked to have a chance to see the car. They all hooked on their rawhide lariats and we started the motor, threw into low gear and each took a front wheel. In this way we bounced onto solid ground.

We found a pass through the Arroyo Negro,

where it was shallow enough to run slowly, with the water just up to the carburetor, which we had raised especially by shortening the intake pipe. We then passed 200 yards of sand and got almost through the Sandy ford of the Arroyo Sanchez, a notoriously bad place. Three yoke of oxen passing at the time were called into service to complete the passage.

A Night in an Indian Hut.

After a few miles of fine going, through pasture fields, opening gates and racing along with hundreds of cattle stampeding after us—they always come running from all sides to see what is passing—we arrived at the Estancia Cambara. In a low hollow on this farm we came to a place where there was a stream full of rushes and muskrats. There apparently was a way through, over some branches of eucalyptus and rushes at our left. We rushed it, hoping to bounce over, but no, just as our front wheels were nearly through

little bonfire on the dirt floor of the two-room hut, and tried to dry our wet clothing, but it was a hopeless task, for the fire seemed to give off only enough heat to boil the water for the yerba mate outfit, and succeeded principally in producing volumes of smoke, which blinded Johanson and myself to the great amusement of seven little round-eyed children, who squatted around us. We discovered later that we were sitting on their table, and that the pieces of log around the room were the chairs. After a few moments of forced conversation about automobiles and the weather, I lay down in the dirt beside the little fire, Johanson having already tumbled off his log.

Dinner at Estancia Cambara.

When we awoke it was the following morning and the "patron", who had returned, was grinning down at us—a little stocky man, with fine chest, sunburned face and the enormous "bombachas" or bloomers worn by the cowboys



The Oakland Crossing the Difficult River Salsipuedes, the Rocky Bottom of Which Makes It a Dangerous Ford.

we sank down above the hub caps at the rear and nearly as bad in front.

It was just midday and the sun was so hot on the water that it seemed impossible to do anything but sit there and make remarks. After three hours' work with the jack, most of the time with it under water, we found a heavy thunderstorm upon us. Gathering up our rubber coats and some sardines and "pop", remaining remnants of our food supply of previous days, we started back toward a hill over which we had come. On the ridge we sighted a house about three miles away and cut straight for it through the grass. The heavy rain came on meanwhile, with plenty of lightning, but this was nothing compared to the shock we received on arriving at the hut.

The forlorn Indian woman told us the men had all gone to Fray Bentos with a herd of cattle (Liebig beef extract works), and that there were no horses or oxen available until their return late that night or in the morning. We sat around a

of Uruguay. About 9 we started off on foot, following him and two neighbors on fine horses, across the prairie to the car. They were unable to move it, and he trotted off to the estancia house of Cambara, which turned out to be nearer than the hut, and where we might have passed an hour or so and gotten help the previous day had the woman told us.

With six oxen came two young men on a stripped chassis, one of the owner's cars at the estancia, which they were trying out. The oxen pulled us out and after settling with the men we accepted their invitation to stop at the estancia for luncheon. We had had nothing but about 20 rounds of yerba mate (Paraguayan tea) and some hot milk since the day before, when the sardines were shared with the Indian family. The tender hearted wife of the "mayor domo" (manager) ran out first with large, clean towels, a pleasant memory, then spread a table under an arbor, where we devoured an unreasonable amount of puchero (boiled dinner), beefsteak,

port wine with brackish water and loads of ice, preserved pears and weak tea. All desire to win races had disappeared for the moment, and it was 3 in the afternoon when we left.

The Camino de Tropa.

We raced through the field until long after dark, when we came onto the terrible "Camino de tropa" (cattle road) we had been told about for a long way back. It is a wide road of black earth, over which most of the cattle in this region are driven to the enormous Liebig works, where their meat is used to fill neat white earthen jars, we know so well back there at home. It had been raining recently, and the road looked like a ploughed field with regular furrows running from fence to fence, but sun baked hard as stone. Nine leagues of this had to be negotiated, and before it was finished we reached a big pantano (lagoon of mud). Here we had to cut the wire fence and make a detour through the fields.

About midnight we came on a Cadillac touring car of the latest model in the hills with a load of bottled beer. We were set right as to roads and soon came to the ferry at Mercedes. A little later, in the town of Duranzo, we were presented with a large bouquet of roses, tied with white satin ribbon, by the belle of the town. She did not explain what we were to do with it, but as she "desired us the triumph" I thought it only fair to hold it in one hand and steer with the other until we reached the edge of the town, when Johanson took the ribbon for cleaning the mud from his goggles and we confiscated the bouquet.

Coffee and More Puchero.

During the morning we stopped for coffee at Santa Catalina, where we were the guests of honor and were served by two pretty little Basque girls. Here we drank two large soup bowls of coffee in company with a crowd of threshing machine men. Then we raced a dinky train for an hour and 55 minutes to Arroyo Grande. We were able to beat it, which was a comfort.

Soon, however, we were stuck in the mud again and this time we seemed to sink deeper the more we shovelled the sticky stuff. I wrote a note and stuffed it in a cold cream jar, wrapped it in my handkerchief and tossed it to the fireman of a locomotive on the noon train as it passed. An hour later the station agent from Guaycura arrived to tell us he had followed my request to sent us three yoke of oxen from the next farm, and had also told his cook to get ready a big puchero for us to eat. He was a real prince, this young automobile enthusiast, and we were sin-

cerely sorry for him as we drove away from his station, two hours later, leaving him leaning disconsolate against the fence outside the building, with no house in sight on all the horizon.

That afternoon we passed through the Mal Abrigo hills, and punctured two more tires before we arrived at San Jose. Here the girls threw flowers at us from the balconies. To see the pretty girls in the interior of Uruguay is to have a big advantage on the casual tourist who only sees the Montevideo residents, but to have them get excited, snap their wonderful eyes and scream at you, is worth all the shovelling of mud one is compelled to do to experience it.

An hour out of San Jose we were compelled to repair another tire. That night, at 10:30, we drove into Santa Lucia, thinking we were in Canelones, one of the points of control still 20 miles or more away. Here we completed the tire repair, in the presence of the comisario (police judge) and the jefe politico (boss) of the town. We left at 11:30 for Canelones, between which city and Montevideo lay the good road, over which we had made the outward trip in 31 minutes. I had the greatest difficulty keeping my eyes open and ran off the side repeatedly. About 12:30 we met a big touring car full of excited young fellows, who held us up to inquire what had become of the Buick. We decided that we were closely pursued by this car and thereafter had no trouble in keeping awake.

THE OVERLAND BRASS BAND.

Musical Organization Will Escort Toledo Rotary Club on Its Annual Tour.

The Overland brass band, composed of 50 men and boys regularly employed in the big plant of the Willys-Overland Company, Toledo, O., will leave that city June 22 on its second transcontinental tour. This time it will act as escort to the Toledo Rotary Club, the occasion being the annual convention of the International Association of Rotary Clubs, in Houston, Tex.

Five days will be spent at the convention. On the southbound trip concerts will be given in Chicago, Kansas City, Wichita and Oklahoma City. At the conclusion of the convention the band and the 2000 delegates from all over the world will board special trains for a circle tour of Texas, visiting San Antonio, Austin, Waco, Beaumont, Fort Worth and Dallas. On the return trip to Toledo concerts will be given in Birmingham, Atlanta, Chattanooga, Lexington and Cincinnati.

CORRESPONDENCE WITH THE READER.

Traction—J. B. S., Atlanta, Ga.

What is the limit of a car's possibilities for climbing a hill; that is, what is the steepest grade a machine can climb?

At Fig. 1 is illustrated a method of calculating grade percentages, and the dotted line shows the approximate angle at which gravity overcomes traction. If it be assumed that the base of a triangle represents a line 1000 feet long and that the first sloping line represents a road having a rise that brings it 50 feet above the starting point, this is figured as 50 feet in a 1000, or five per cent.; in other words, one foot rise for every 20 feet. The latter distance does not mean distance actually travelled by a car in ascending such a slope, but distance measured horizontally with reference to the slope.

The grade is measured by the tangent of the

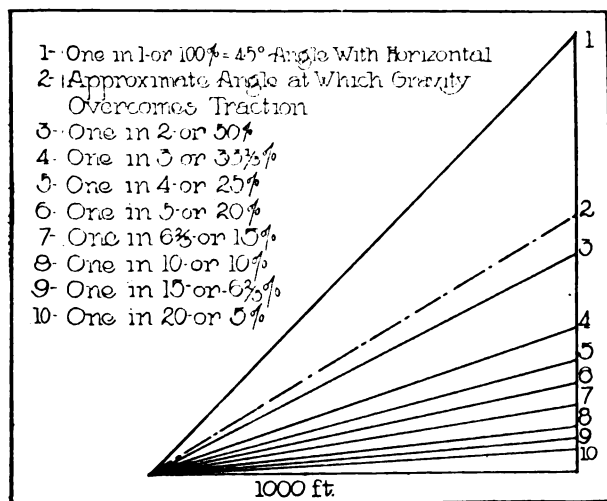


Fig. 1—Illustrating Method of Calculating the Grade Percentages.

angle of inclination and not by its sine, so that a grade that represents 100 per cent. corresponds to an angle of inclination of but 45 degrees, and not 90 degrees, or perpendicular, as is commonly supposed.

At the upper end of the next sloping line the elevation would amount to 66.66 feet, equivalent to a rise of 6.66 feet for each 100 feet travelled horizontally. So one in three corresponds to a 33.33 per cent. grade, one in two to a 50 per cent. grade, and so on until a 100 per cent. grade is reached, which, as noted, is the equivalent of a 45-degree angle.

Fuel Gauge—C. H. Need, Cleveland, O.

I have a 1914 Paige-Detroit car. The gasoline tank is under the cowl and is filled through a curved pipe extending into the front compartment of the car. I have

no way of telling how much gasoline the tank contains. Would you kindly inform me what kind of a gauge could be put on this tank and where I may secure one?

There are a number of concerns manufacturing fuel gauges and while they could supply the information desired, it would be better to write the maker of the car, as he would be in a position to know the type best adapted to the system and which could be fitted easily.

Tire Paint—C. H. A., St. Louis, Mo.

Will you kindly give information in your valuable journal, of which I have been a reader for many years, as to what is the composition of the white paint used for painting tires, as I would like to make some for myself and try same on my shoes?

The writer is not familiar with the recipe for making the tire paint referred to. The marketed material is not expensive and would be more economical in the end. The Northwestern Chemical Company, Marietta, O., manufactures Tire-Lac, which is a specially prepared paint for use on tires and rubber mattings, etc. It protects the material from the deteriorating effects of sunlight, oil, etc., and comes in two colors, rubber white and gray.

Crawford Motor—W. Shipley, Peetsburg, N. Y.

Can you inform me as to the opening and closing points of the exhaust valves of the 1906 Crawford motor? It has automatic intake valves, is a four-cylinder engine and has a bore of 4.5 inches and stroke of the same dimensions.

The Automobile Journal's files do not contain the valve timing diagram of the motor referred to. The information can doubtless be obtained from the maker, the Crawford Automobile Company, Hagerstown, Md. In writing, state the number of the motor and the model of the car to insure obtaining the proper diagram.

Dynamo—F. C. G., Trego, Cal.

I would like to know if I could use a dynamo generating 20 volts for lighting purposes on a motor car. Would I have to use a storage battery or could I light the lamps direct from the dynamo? I would also like to know what voltage and candlepower lamps to use with the dynamo.

A dynamo generating 20 volts could be used for lighting purposes on a motor car provided a number of conditions were taken into consideration. In the first place, the maximum output of the generator must be known, else when supplying the lamps direct the filaments are likely to be burned out.

Lighting generators for motor cars generally include means for regulating the output; that is, provision is made to prevent excessive voltages when the car is being driven at high speeds.

There are various types of controllers, these including mechanical and electrical. Their function is, as above explained, to hold the output at approximately a predetermined point.

The ratio of drive is another factor. If the dynamo is driven at crankshaft speed, for example, it is possible that the current generated will not be sufficient to carry the lamp load. On the other hand, if the armature of the generator be driven at double or three times crankshaft speed to obtain the desired efficiency at low motor speeds, it is obvious that at high car speeds the lamps will be overloaded unless some form of regulator is utilized.

If a storage battery is to be employed, which is to be recommended as it makes possible a supply of current when the engine is inoperative, some form of cut-out must be utilized to prevent the battery from discharging through the dynamo.

Best Clutch—Wallace Cox, Hubbard, Ia.

Please publish in your next issue which kind of clutch is the most desirable with a sliding gear transmission, whether a cone or multiple disc running in oil or dry. This information may be of value to other readers as well as myself. I would like the answer published, not by mail.

Any of the types mentioned are desirable and efficient. It is a matter of opinion and all three forms are employed in high grade cars. The writer has driven machines equipped with the types mentioned and, if his personal opinion is desired, would state that one is as satisfactory as the others.

Piston Rings—Information, Salt Lake City, Utah.

In reading your book I have noted reference made to piston rings being cut eccentric and concentric. What is the difference between the two types?

It is a generally accepted idea that if a ring be turned concentric inside and out, then split,

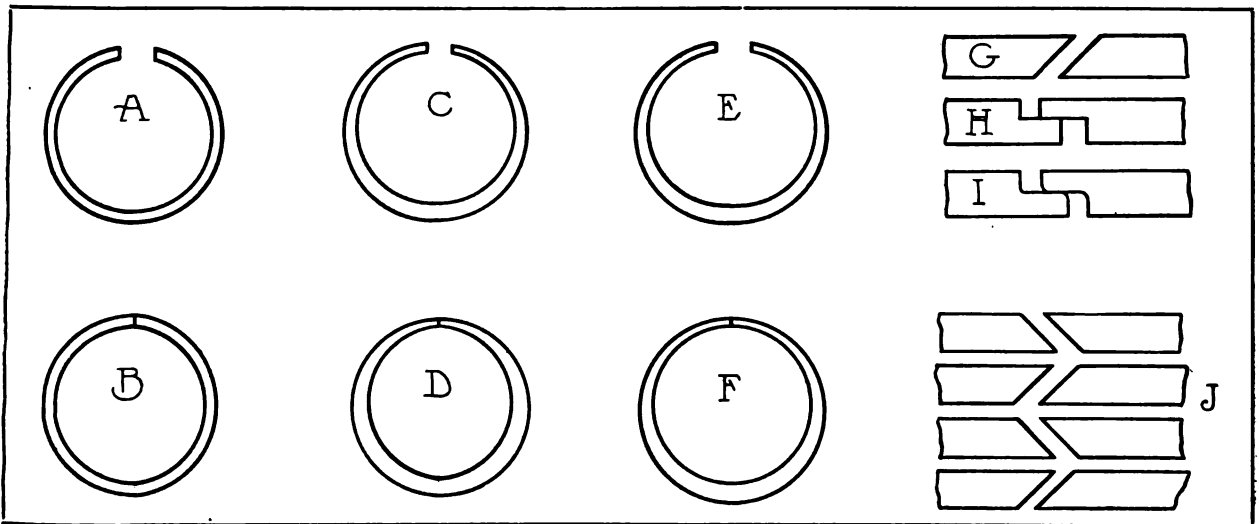


Fig. 2—Piston Ring Construction: A, Concentric Type Open; B, Closed; C, Eccentric, Open; D, Same Closed; E and F, Eccentric Finished to True Circles Inside and Out; G, H and I, Showing Different Steps; J, Diagonally Cut Rings Arranged Oppositely.

mo when the latter is not generating a current in excess of that of the cells. If the circuit between the battery and dynamo were not broken, the former would tend to drive the generator as a motor. The cut-out or control member also serves to connect the dynamo with the battery when the generator develops sufficient energy to charge the cells.

Relative to the proper lamps to use: It would depend upon the maximum output of the dynamo as above explained. If the battery is to be included in the system, it could be floated upon the line; that is, all current used for lighting, etc., could be drawn from the cells and the dynamo used solely for charging purposes. These factors would have to be considered in selecting the lamps.

the outward pressure on the cylinder walls, when the ring is closed and in its place, will not radiate from its centre. This is demonstrated in the illustration at Fig. 2, A and B, showing the ring open and closed respectively. It will be noted that with this design there are three bearing points, one on either side of the split and at the lowest extremity of the circle.

Such a type would not be practical for service in a cylinder, so the ring is turned thicker in the first instance and then turned to a true circle after being closed at the gap, thus giving a full bearing surface all around its circumference. By doing this, however, some manufacturers make it a practise to turn out the inner periphery of the ring eccentric to the outer, in order to equalize the pressure at all points of the ring. This is de-

picted by the rings illustrated at C and D.

A ring of the eccentric type is shown at E and F and costs but slightly more to manufacture than the type previously mentioned. It is turned to a perfectly true circle inside and out with the gap closed, the outer circle being eccentric to the inner. By referring to F it will be noted that not only are the pressures even on all parts of the ring, but less pressure is required to make it gas tight. It is held that there is less uneven wear of the cylinder walls, less heat developed and greater efficiency of the motor.

Relative to joining the rings: There are several methods, some of which are illustrated at G, H and I. That at G consists of a diagonal cut across the face. There is a tendency in this type to rotate in the opposite direction to that in which the lower diagonals point, and some make a practise to cut every other ring in the opposite direction to its neighbor, as shown at J.

Bore and Stroke—A. A. C., Concord, Mich.

Will you please state in your columns for the benefit of a new owner if the decreasing of the bore of a cylinder and lengthening its stroke would add to the horsepower or diminish it? What would be the difference in the horsepower of two motors, one having a bore of 3.625 inches and stroke of 4.5, and the other a bore of 3.75 and stroke of 4.5 inches?

Relative to the first question, it would depend on how much the bore was decreased and the stroke increased; that is, whether the piston displacement was increased over normal or otherwise.

The horsepower of a cylinder, according to the S. A. E. formula—which considers bore only—having a bore of 3.625 inches is 5.1 or 20.25 for a four-cylinder engine of the same dimensions. That of the larger engine is 5.625, or 22.5 for four cylinders. These ratings are based on the formula which squares the bore, multiplies by the number of cylinders and divides by 2.5.

Setting Timer—F. B. T., Westerly, R. I.

What is the best position to set a timer or commutator for a four-cylinder motor, so as to make easy starting without any danger of a kick? Is the Ford timer setting variable or fixed?

The setting of a timer for a four-cylinder motor would vary with the design of the engine. Some make a practise of slightly advancing the commutator when the spark lever is fully retarded, while others utilize what is termed a dead centre position.

The last named is obtained by cranking the motor until the piston of the first cylinder has completed the compression stroke, and the crankthrow is vertical. The contacting member of the timer is then so adjusted as to close the primary

circuit. With a roller and wipe type of commutator, the roller should just make contact with the metal segment, and of course, the segment must be connected with the primary wire leading to the No. 1 coil.

The writer recommends setting by the following method: Place the piston of the first cylinder on dead centre or completion of the compression stroke, then crank the motor until the piston has descended about .25 inch or more on the downward or firing stroke. Next set the timer with the spark lever fully retarded so that the roller just makes contact. This will prevent the possibility of a kick, provided of course, spark linkage is not badly worn, creating undue play.

If it be found that the motor starts hard with this retard, the lever can be advanced slightly, the amount being determined by experimentation. The intensity of the spark and mixture are factors to be considered, and frequently difficult starting is caused by a weak spark at low speeds or too thin a mixture. The last named burns slowly.

The position of the Ford timer is fixed, it being retained on the camshaft or commutator shaft by a pin.

Cork Inserts—Reader, Providence, R. I.

What is the best method to pursue in fitting new cork inserts in the clutch of a type 10 Autocar? What is the proper thickness of the cork?

The best and simplest method of inserting new corks in the clutch of the car referred to is to disconnect the clutch linkage, remove the bolts retaining the transmission housing and slip the assembly back and out. This will permit of easy access to the plate carrying the inserts.

In fitting new inserts, a good grade of cork should be employed, and the new members should be slightly larger in diameter than the openings into which they are fitted so as to retain them. The inserts should not extend beyond the surface of the plate more than .03125 inch, as their function is to minimize the harsh engagement that would otherwise follow when the plates are engaged. If the inserts are too thick they will take the drive, instead of the plates, and it will not only be difficult to fully release the clutch, but is apt to result in trouble. The surfaces of the inserts should be made as smooth as possible and it is not good practise to depend upon service to wear them smooth.

James W. Gilson, formerly with the Mitchell-Lewis Motor Company, Racine, Wis., has become associated with the L. P. C. Motor Company of the same city.

BUYS FOURTEEN OUTFITS.**Ford Motor Company Pays Akron-Williams Equipment a High Compliment.**

It cannot be denied that when a motor car manufacturer of wide reputation selects equipment for its branch houses, care is taken to provide that which is expected to meet every requirement. The Williams Foundry & Machine Company, Akron, O., is therefore justified in considering that it was paid a compliment of no mean importance when the Ford Motor Company, Detroit, recently ordered 14 of its Akron-Williams localized heat tire repair outfits, for installation in each of its service stations throughout the country.

It is explained that this large order was placed on a merit basis, and was only given to the Williams company after careful tests and comparisons with other equipments. It is well to remember, in this connection, that the Akron-Williams vulcanizers have a patented and exclusive feature of localized heat chambers. Each section is heated by three separate and distinct steam chambers, a construction which is held to make it possible to apply the heat precisely where the repair is to be made. Over curing or burning is claimed to be prevented in this manner.

AS TO PURCHASING POWER.**Simplex Automobile Company Discloses Partial Result of Its Investigations.**

Automobile manufacturers and dealers are giving much closer application to the study of local conditions than formerly was true. There is a growing feeling that facts respecting the purchasing power of a given city or district are decidedly important. The Simplex Automobile Company, New York City, through its wholesale manager, Fred J. Titus, has just completed a very exhaustive investigation along this line, and some of the figures obtained have been made public.

For instance, it is found that there are nearly 5000 men in New York State who are known to possess from \$250,000 to \$1,000,000 or more. There are 10,702 who are rated as possessing over \$100,000, and in addition to these 40,000 are credited with being worth \$50,000 and over. In Massachusetts there are 2300 in the \$250,000 class, 4797 accredited as being worth more than \$100,000 and 17,801 who are held to be worth from \$50,000 to \$100,000.

The Simplex company produces a high priced car and naturally is interested in securing data concerning men of considerable means, but the suggestion offered in these figures is one which may be applied locally by each agent. An example is cited in Philadelphia, which has 2110 men worth upwards of \$100,000, according to this same source of information.

JOINS MERKEL FORCES.**Harry Gleisman Will Look After Motorcycle Sales in Middle Atlantic States.**

An accompanying illustration presents Harry Gleisman, who has just joined the sales force of the Miami Cycle & Manufacturing Company, Middletown, O., maker of Flying Merkel motorcycles, covering the states of New Jersey, Pennsylvania, Delaware, Maryland and Virginia. He is well known in the industry, particularly as president of the New York Motorcycle Dealers' Association, which he helped to organize, and is its first and only president.



Harry Gleisman, with Miami Cycle & Manufacturing Company.

Mr. Gleisman has been identified with cycling interests since 1889. He was one of the first members of the old League of American Wheelmen, joining the Massachusetts division in 1890. In 1894 he opened a small repair shop in Thompsonville, Conn., and five years later he had established himself in New York City. In 1903 the name of the house was changed to the Tiger Cycle Company. It was in 1900 that he first became interested in the motorcycle, becoming the proud possessor of an old Thomas Autobike. In 1904 he took the agency for the Rambler motorcycle and was a participant in that memorable endurance run, the first Federation of American Motorcyclists' run from New York to Albany and return. He will use a Flying Merkel exclusively in covering his new territory.

IN THE COMMERCIAL VEHICLE FIELD.

Some Interesting Examples of New Designs in Spring Suspension for Motor Trucks and Business Wagons---Constructional Details of Parcel Post Kar.

BECAUSE of the vibratory influence upon the metal of commercial vehicle chassis, the springs that support the frame are of decided importance. The rubber tire is distorted by pressure upon it, and there is some degree of resiliency afforded by it, but the wheel and the axle are assembled solidly in contact with each other, so that the road shock, which varies with the weight, speed, character of obstruction and the condition of the tire, is communicated through these and is supposedly absorbed by the spring. The frame, and the mechanism it supports, is subjected to the vibratory influences of the motor, which is operated at greatly varied speeds, and these also are assumedly absorbed by the springs. Thus it will be seen that these members perform a double function, insofar as protecting the construction is concerned, to say nothing of protecting the freight.

Chase and Atterbury Designs.

The designing of spring hangers or brackets has been given much attention, inasmuch as these must be sufficiently strong to resist all strain, the stresses must be so distributed that the frame will not be twisted by sidesway, and action must be free at all times. The American practise has been to have the ends of the rear springs so coupled that there will be unrestricted movement, the driving thrust being taken by radius rods, while torque arms have generally been used to resist the braking and traction stresses.

The new Chase three-ton truck and the Atterbury 3000-pound wagon chassis have been de-

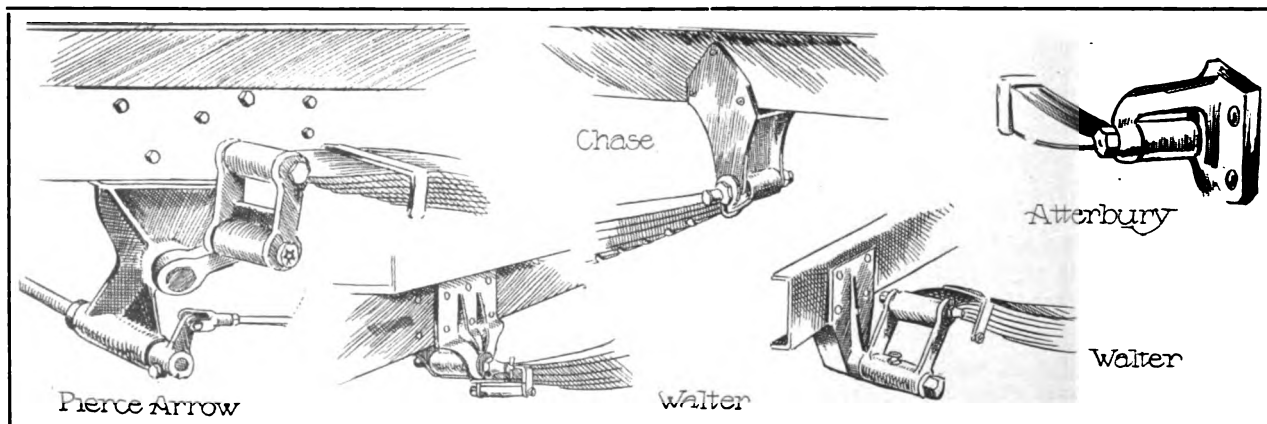
signed in accordance with French practise, which is to dispense with radius rods and to use comparatively flat arc rear springs which are pivoted transversely in the forward hangers, as are the front springs in American construction, with the rear ends shackled, all stresses being cared for by the forward sections. Both of these machines are worm driven, and provision is made with telescoping shaft connections to prevent end thrust, for the rear axles will be moved forward and backward slightly with the deflection and reflexion of the springs.

The comparatively flat arcs of the springs (the Chase design is straighter than the Atterbury) minimizes this movement, but there is greater wear at the rear spring eyes. The stresses upon the springs require larger and heavier hangers or brackets, and the Chase hanger is webbed and fitted so that it bears the full width of the frame, and the bearing surfaces are very large.

Details of the Construction.

The master and main leaves are turned to form an eye, the two being an inch thick, and the other leaves are thin and longer than the average, being lipped to prevent separation. The spring bolts are very large and have bearings in bronze bushings. It will be noted by the accompanying sketch of the front end of the rear suspension that this spring is nearly flat when the vehicle is light, and when loaded it is practically horizontal, so that the driving thrust is almost parallel with the line of the chassis frame.

Another sketch shows the manner of retain-



Linkage of Shackles on Pierce-Arrow Two-Ton Chassis; Pivoted Ends of Rear Suspension on Chase and Atterbury Designs; Rear Connection of Walter Front Springs, and Hanger of Rear Spring on the Walter.

ing the underslung spring to the square section of the cast steel axle housing, by long clips that pass through the housing and a saddle on which is seated a large rubber check. The spring seat is formed with lugs that fit at either side of the axle and prevent longitudinal movement of the spring. The rear shackle is a double yoke with comparatively long arms that carry very large bolts, this providing for considerable movement of the spring with practically no resistance.

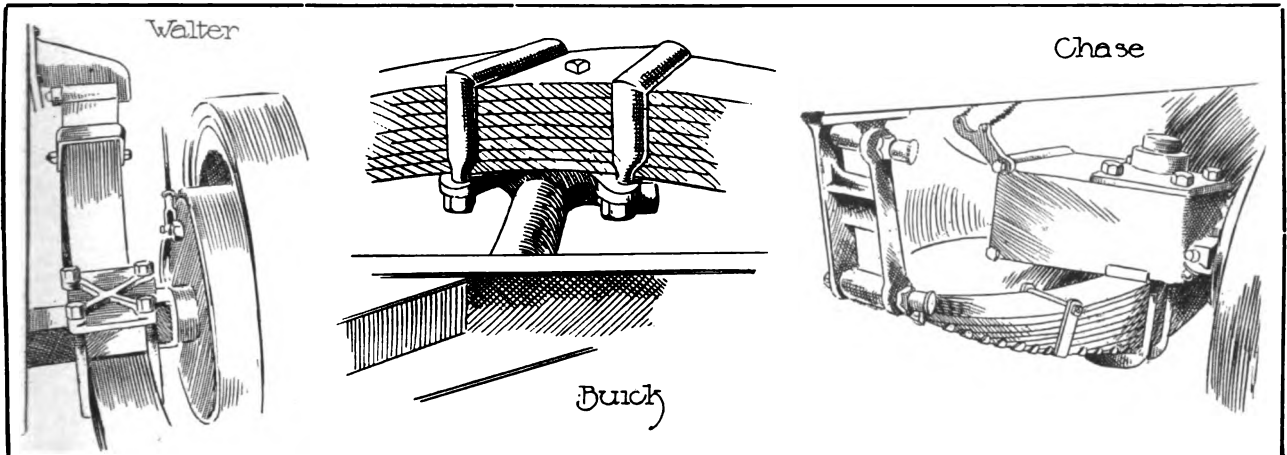
The Atterbury design has a bracket bolted to the frame side member, with a curved arm extending, in which is an eye. The arm is carried by a boss in the centre of the bracket, and this is bored in the centre to coincide with the eye in the arms. The spring eye is fitted with a bronze bushing and the spring bolt is carried through the arm and screwed into the boss, this giving a very light, but strong construction, retaining the

weakening them by drilling for bolts, and making a solid assembly that can be secured to the axle in such manner as to insure that it will not be affected by the strains upon the clips.

The underslung rear springs are mounted at both ends in shackles, the front hanger being a cored casting that is bolted to the side of the frame, into which is fitted a heavy bolt carrying the usual yoke. The rear shackles are yokes that are mounted on the arms of brackets bolted to the chassis side frame members, the ends being carried by bolts fitted through the spring eyes.

Pierce-Arrow and Buick.

In the Pierce-Arrow two-ton machine, the front part of the rear spring hanger is a large casting lightened by judicious webbing, and this carries at its lower end a long bearing in which is mounted the emergency brake shaft. Arms at



Manner of Seating the Underslung Rear Spring on Walter Five-Ton Front-Wheel Drive Model; Arm Carrying the Full Elliptic Member on Buick, and Rear Spring Seat and Double-Yoke Shackle on Chase Three-Ton Design.

spring rigidly, and bringing the chassis frame very low.

Walter Front Drive Machine.

In the Walter front-wheel driven truck, which has the Latil suspension, the forward ends are shackled and the rear ends pivoted in hangers, so that the machine is really drawn by the springs. To secure sufficient turning radius for the wheels, the springs are mounted under the frame, and as there is not the driving thrust to be endured the principal purpose is to obtain a construction that will not yield under the drawing or pulling strains. This form has been used in France for nine years with satisfactory results.

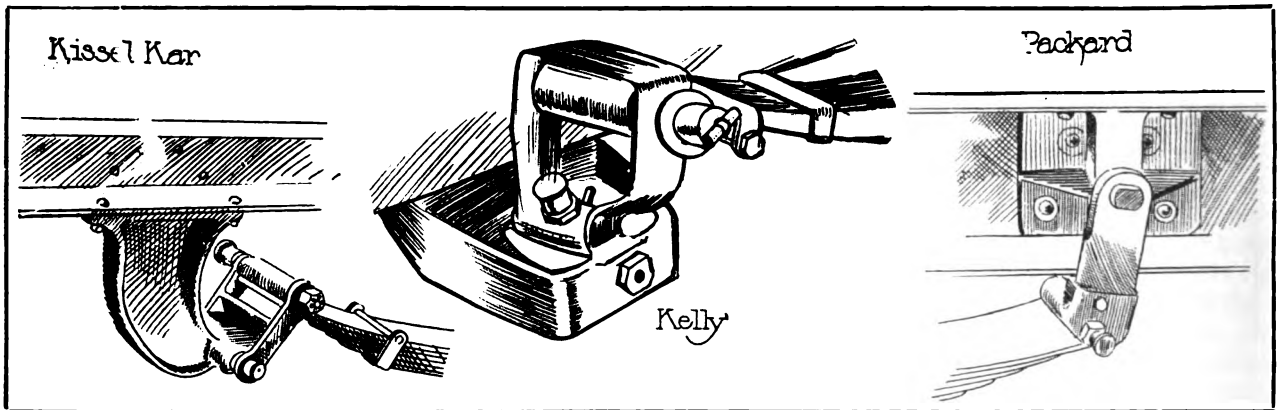
The springs are carried forward on conventional shackles and there is a very free movement. The centres of the forward members are bonded by sleeves shrunk on while hot, this insuring the retention of the plates without

either end of this shaft are connected with the yoke ends of the pull rods of the brake linkage. The shaft somewhat stiffens the frame and preserves the relation of the frame member and springs. The rear ends of the springs are rigidly connected by a rod.

The Buick delivery wagons are equipped with full elliptic springs at the rear, and the frame is strengthened by a cross member directly above the axle and in line with the centre of the upper halves of the springs. At either side a bracket is bolted that extends diagonally upward and ends in a wide seat to which the upper half is bolted by clips.

Kelly, Packard and KisselKar.

With the forward part of the rear spring bracket on the five-ton Kelly chassis, there is a casting bolted to under web of frame members, and instead of the usual arm there is a rectangu-



Cored Cast Steel Forward Hanger of the KisselKar Rear Spring; Rectangular Bracket and Shackle of Front End of the Kelly Five-Ton Rear Suspension, and Forward Shackle of Rear Springs on Four-Ton Packard.

lar section with a web filling a consideration portion of the space within the rectangle. The spring shackle is rectangular, one section fitting into the opening of the hanger and being secured by a large bolt that passes through both sides. The spring eye is fitted into the opening of the shackle and mounted on a bolt.

The four-ton Packard chassis has the rear springs under the frame, and the forward ends are mounted in shackles with flat side links, but to bring the spring close to the frame and afford ample bearing the bracket is placed in the channel of the frame members. The bracket bearing is the full width of the spring, being supported by the webs. The links are large and the bolts extremely heavy.

The three-ton KisselKar truck frame is mounted above the rear springs, and the forward shackles are carried on hangers that are cored to

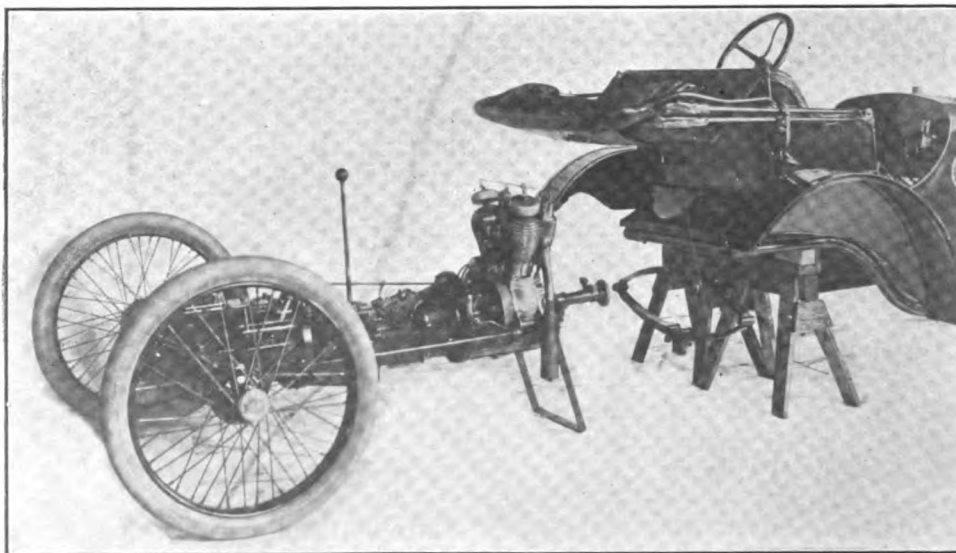
secure lightness, the size of the hangers, as seen from the side of the chassis, giving the impression of massiveness and unusual weight.

THE PARCEL POST KAR.

Constructional Details of One of the Newest Light Package Delivery Wagons.

A machine that possesses many features of interest is the Parcel Post Kar, made by the Parcel Post Equipment Company, Grand Rapids, Mich. It is designed as a light package delivery wagon, and may be supplied with either a two-cylinder, air-cooled or a four-cylinder, water-cooled motor. The power plant is located practically in the centre of the chassis, with the driver's seat directly over the rear axle and the package carrying compartment between the front wheels.

The wheelbase is 90 inches and the tread 52. The seat accommodates two persons, with the driver at the left. The parcel van is 56 inches long, 27 wide and 18 deep. This is so installed that it may be withdrawn from the chassis at a moment's notice, leaving the motor exposed for work. In fact, the entire machine may be dismantled readily, as indicated by an accompanying illustration. How-



The Unit Power Plant of the Parcel Post Kar Is So Assembled with the Rear Axle That It May Be Quickly Removed When Necessary.

ever, the engine compartment is equipped with doors which permit easy access to the working parts for minor adjustments, etc.

The two-cylinder engine has bore of 3.5 inches and stroke of 3.5625, being rated by the maker at 10-12 horsepower, while the larger motor has bore of 2.5 inches and stroke of four, and is rated at 12-14 horsepower. Ignition is by At-water Kent Unisparker in either instance. The fuel tank is mounted on the dash in the engine compartment.

Otherwise the construction is the same with either power plant. The clutch is a multiple disc, operated in oil, and the sliding gear transmission affords three speeds forward and reverse. The main driving shaft of the gearset carries a sprocket, and a roller chain transmits the power to a sprocket incorporated with the differential assembly in the rear axle. This chain runs in a path of oil. The assembly is carried on a ball trunnion at the centre of a frame cross member and is supported by the two wheels at the rear, so that by releasing the forward trunnion and the engine connections at the front end, the body and frame may be lifted and the engine supported on two standards for convenient work.

The rear axle is of the usual live type, with the wheels keyed to the driving shaft, which are mounted on Hyatt roller bearings. Springs are transverse full elliptic. The brake lever operates a band fitted with cork inserts that contracts on a drum within the rear axle housing. When this lever is moved to an extreme forward position it can be used to start the motor, which is connected by linkage, with a shaft carrying a pair of ratchet arms that engage with a six-inch gear which in turn meshes with a pinion on the engine shaft. A quick backward movement of the lever brings one of the arms into engagement with the gear, and a clutch is engaged when the pinion is forced into contact with a collar on the shaft. As the pinion is free, it is automatically disengaged when the motor begins firing. This starting device is entirely enclosed and thoroughly lubricated.

The clutch pedal also serves a dual purpose, the first movement disengaging the clutch, while pushing it further forward applies a brake to the transmission.

MINIMIZING WAITING TIME.

Interesting Results Obtained by Method Employed by Buffalo Haulage Contractor.

Another interesting example of the possibilities with mechanical transports in contract haulage, through the use of special equipment, is evidenced by the results obtained with four five-ton Pierce-Arrow trucks, made by the Pierce-Arrow Motor Car Company, Buffalo, N. Y., in service with J. F. Kulp & Sons of that city. The concern has the contract for hauling 590 car loads of marble, to be used in the construction of the new Catholic cathedral.

The stone must be handled carefully, for the reason that it is easily defaced. When the contract was begun, much time was lost in loading the trucks and in unloading at the building site.



One of the Pierce-Arrow Five-Ton Trucks with Specially Designed Equipment, Utilized by Buffalo Contractor in Hauling Marble.

Cranes were used at the railroad terminal, but the unloading was by hand, each piece being handled separately.

In order to overcome this handicap, a number of shallow boxes, termed skips, were constructed, these being mounted on small wheels so as to be moved readily and quickly. At the building site a platform was made with a runway to the ground and plank ways were laid when necessary.

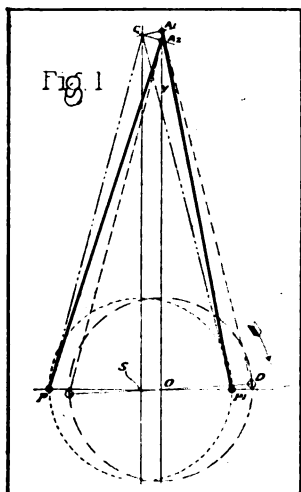
Some of the skips were left at the railroad, where they were loaded by the cranes during the absence of the truck, and at the other end of the route the loaded skips were quickly replaced by empties. By utilizing this method one of the trucks was able to haul between 50 and 55 tons of marble in a nine-hour day, the round trip averaging about eight miles.

BALANCING INTERNAL COMBUSTION ENGINES.

Third and Final Installment of F. W. Lanchester's Paper Dealing with Balancing of Engines in Which Cylinders Are Not in the Same Place.

In the two previous installments of F. W. Lanchester's article on engine balancing, published April 10 and 25, were discussed the defects of balancing which are involved in connection with the different cylinder arrangements, while the question of torque vibration was investigated. In the following article the balancing of engines in which the cylinders are not in the same plane is discussed, the V arrangement of multi-cylinder engines being selected as an example:

A question of some interest in the matter of balancing is raised by offsetting the crank, which has become the practise of many firms during the last few years. The main object of this practise is to obtain a more direct thrust from the connecting rod and diminish the piston friction on the explosion or expansion stroke; incidentally, in many cases advantage is taken of the offset of the crank to secure greater clearances for camshaft and valve mechanism. It is of interest to study to what extent this offset introduces new factors into the balancing of the engine.



In Fig. 1, let the crankshaft centre be represented by the point S, and the cylinder axis by the line OY, the distance SO being the offset measurement. Taking the two opposite positions with the crank at right angles, we have the connecting rod indicated by the heavy lines A_1P and A_2P . The distance separating the points A_1 and A_2 may be reached by the construction shown, in which the point C represents the piston pin position of an engine without offset, and the lines $C A_1$ and $C A_2$ arcs struck from the crankpin positions p and p_1 , or, as shown in the figure as an approximation, tangents to these arcs drawn from the point C. In the position of the stroke shown, it is evident that the angle A_1CA_2 is at its maximum, and since the angle A_1CA_2 is equal to pCp_1 , it is clear that the motion of the points A_1 and A_2 may, to a first degree of approximation, be divided by superposing a harmonic motion of amplitude A_1A_2 on the normal motion of the point of C in an engine in which there is no offset. Thus, if we take a phantom crankpin orbit whose centre is the point O, and out of phase with the main crank by an angle $p_1O D$ and coupled up with a phantom connecting rod, as shown in Fig. 1, we shall have nearly an identity of motion in a phantom piston driven from the crankpin D and crank centre O (without offset), and in the real piston driven by the crankpin p on the crank centre S with offset O S. We may therefore regard the effect of the offset on the piston motion as that of an alteration of phase through an angle $p_1O D$ derived from the construction given in Fig. 1. Thus it follows that the engine with offset is not materially different, so far as its main balance is concerned, from that without offset, the forces and moments being, however, retarded by difference of phase represented by the angle $p_1O D$.

An alternative and more exact treatment may be given as follows:

Case 1. Rod Length Taken as Infinite.

Let offset angle be represented by α , Figs. 2 and 3, and let m and m_1 represent piston pin travel, and let o be point of midstroke. Take radial component of stroke n and n_1 to represent the stroke path of a phantom engine with same crankthrow, but with no offset. Take q_1 , q_2 corresponding positions (on basis of rod length=infinity) by normals to the connecting rod direction, Fig. 4; then the motions and velocities of the actual and phantom pistons will at every instant be in constant ratio and the motion of the piston in the offset engine is therefore, as in the phantom engine, harmonic. Also, since its phase corresponds to the path n and n_1 , which in the actual engine is inclined at angle α to the vertical, the phase of the main piston disturbance will be displaced through an angle α from that of the engine without offset.

Case 2. Rod of Finite Length.

We now require to investigate the octave vibration. This, as we have already seen, is due to the vertical variations in the length of the connecting rod owing to its angularity.

In the offset engine, Fig. 2, eliminating the vertical component of motion, one end of the connecting rod is describing a harmonic motion along a horizontal (as drawn) path p and p_1 , while the other end is describing a path whose horizontal component is of amplitude k and k_1 , which is harmonic to a first degree of approximation, and 90 degrees different in phase from the motion p and p_1 . This is represented graphically in Fig. 4.

Let r =crank radius=on (Fig. 2.)
 b =half distance k , k_1 .
 a =offset angle.

In Fig. 4, let abscissae represent angular motion in circular measure.

Then $B = b / (r + b)$.

And from the properties of the sine curve j is unity (=1 radian), hence

$$B = b / r + b$$

but

$$b/r = \tan a$$

but b is small in relation to r .

Therefore (approximately)

$$B = \tan a,$$

and a coming within the definition of a small angle,

$$\tan a = a \text{ and } B = a.$$

Thus, the octave vibration is out of phase with the main vibration to the extent of the offset angle. Inspection shows this is in direction such as to cancel the offset angle, so that the octave vibration in an engine with offset is the same in direction and phase as for an engine without offset.

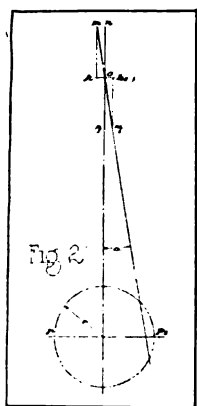
That is to say, in a vertical cylinder engine with crank offset—

1. The octave component of the piston motion is vertical.
2. It is in phase with the vertical component of the crank.
3. In the axial line of the cylinder.
4. Out of phase with the main component of the piston motion to the extent of the offset angle.

Balancing of Components in Practice.

Quite apart from the question of balancing in design and the theoretical aspect of the subject, it is necessary to devote some consideration to the actual carrying into effect of the intentions of the designer in the shops. It is useless to devote time and attention to the elimination of vibration on paper unless a reasonable degree of care be exercised in the course of manufacture to insure the necessary degree of accuracy in the weights of reciprocating parts, the proper balancing of rotating parts, etc. On the other hand, the author has of recent years had personal experience of balancing appliances which

in practical use have proved an entire delusion, and we frequently hear talk of a degree of accuracy in weighing reciprocating parts, etc., that is quite beyond the requirements of the case. It is useless, for example, in



the case of an ordinary four-cylinder engine, in which the unbalanced forces may run into half a ton or more, with a reversal of sign twice per revolution, to expect to obtain any advantage whatever by weighing pistons to within a quarter of an ounce or by whittling down connecting rod stampings to a similar degree of accuracy; such fastidious exactitude shows an absence of all sense of proportion.

Until a few years ago it was considered sufficient for the purpose of the automobile engineer to balance statically such items as the flywheel and the crankshaft. The shape of the former, namely, its short axial dimension, renders the possibility of serious dynamic want of balance extremely remote. In the days when cranks were machined all over, the dynamic balancing could be well taken care of by the dimensions assigned on the drawing, but during the last few years it has become almost general to employ stamped cranks which are not machined over their whole surface; consequently at the present time there is something to be said in favor of balancing the crankshaft dynamically.

In the author's own experience it is certain that where dynamic balancing is adopted the machines and method employed should be controlled with considerable care, and made subject to special inspection.

Defects in Balancing.

In one case the author's experience not only illustrates the danger of putting a machine or appliance that requires special knowledge into the hands of an ordinary shop foreman or mechanic, but also incidentally shows the futility of superexact balancing where the ordinary four-cylinder engine is concerned. The circumstances were as follow: A bad case of synchronous vibration in connection with a four-cylinder engine of a new type being under investigation, the author decided at the outset to make sure of his ground by personally testing the balance of all components; the flywheel had previously been balanced both statically and dynamically on a special machine of well known type; it carried the proper view marks and showed evidence of both balancing processes. It was duly removed from the engine and personally tested for static balance by the author, when a defect of over four ounces in the rim was discovered. This was ultimately traced to the fact that the dynamic balancing machine was defective in principle, and, although the static balancing had been quite properly carried out, the subsequent use of the dynamic balancing appliance had resulted in the static balancing being undone and the wheel being passed officially with the error mentioned. Incidentally, it may be stated that the defect in this machine appeared to be that the flywheel was mounted on a cup and peg support, which, owing to its angle of friction, allowed a certain ambiguity as to the axis of rotation. After some investigation the machine was condemned and its use discontinued. As an amusing sidelight on the subject, the fact may be recorded that when the flywheel was put back with four ounces removed from the rim on one side to secure static balance, the vibration of the engine was not distinguishably better or worse! This is not the author's only experience in the same direction; the constitutional error of balance in a four-cylinder engine is so great as entirely to mask anything less than a missing piston or lack of balance of about that magnitude.

Difficulties in Practise.

In connection with the crankshaft, while for the stamped crank dynamic balancing might be of considerable service, difficulties have in practise arisen. When, for example, on the Norton balancing machine, or other machine of similar type, a four or six-throw crank is running at speed, the distortion owing to the unsymmetrical distribution of the throws is so great a disturbing factor as to render the process uncertain and quite uncommercial. Attempts have been made to get over the difficulty by attaching balance weights to the crankthrows in order to prevent their centrifugal force causing flexion, but the whole business becomes far too

elaborate to be of real service.

There are three alternative forms of support that may be adopted when mounting parts for static balancing. The wheel or part may be mounted in ordinary lathe centres, a mandrel being used if necessary; the centres require to be jarred by hammering in order to eliminate the static friction and render this method of support sufficiently sensitive to indicate small errors of balance. Another method is to roll the part (mounted on a mandrel in the case of a flywheel or similar part) on two parallel horizontal straight edges mounted on a cast iron bed. Both mandrel and straight edges should be properly hardened and ground, and the cast iron bed permanently installed and accurately levelled. A third method, which is not easily applicable excepting in the case of a flywheel, is to employ a mandrel furnished with perfectly axial knife edges at its extremities.

Reciprocating Components.

The question of weighing reciprocating components, etc., calls for no particular comment. It is customary in the best class of practise, as represented by the six-cylinder engine, to bring all pistons within a definite weight variation limit, which is usually fixed at about half an ounce or one ounce for pistons and the like, and to weigh the ends of the connecting rods separately, the end not being weighed being supported on a loose mandrel or knife edge. Recently a special weighing machine has been introduced to weigh both ends of the rod simultaneously; an appliance of this kind, however, has yet to justify its existence.

Methods of Dynamic Balancing.

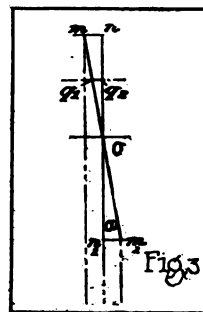
Any running part that is statically balanced may or may not be dynamically balanced; but any piece that is in dynamic balance is of necessity also in balance statically. In the event of a statically balanced piece being out of dynamic balance, it requires two weights of equal and opposite moment to be applied at some definite axial distance apart, and any given want of dynamic balance can always be disposed of by two such weights and two only. It is obvious that in place of definitely adding weights, weight may be subtracted by drilling or otherwise. It appears well to make the above formal statement, since the author has frequently seen wheels or other components after going through the so-called process of dynamic balancing with two or three entirely different sets of drillings, and it is not always easy to convince a foreman that one pair of drillings is all that is necessary if the work is properly carried out.

There are two principles on which the design of a dynamic balancing machine may be based: the one is to run the piece about its geometric axis and measure or indicate the resulting forces or couple, weights being added until such couple is eliminated. The second method is to mount the piece in a springy or yielding support, spinning it at a high speed till it settles down to run on its principal axis; and it is then marked by any usual method to show defect of balance. It is the latter method that is most usually adopted. In this method it is advisable to test and mark the piece, first running in one direction and then reversed, to eliminate the effect of lag.

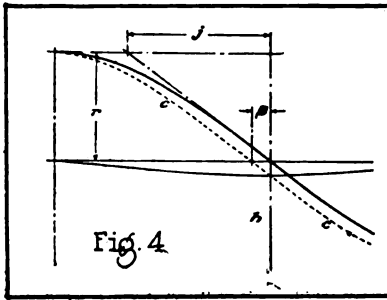
Dynamic Balancing.

The author does not consider that the question of dynamic balancing has as yet been solved in a thoroughly satisfactory manner; the appliances in use, as already stated, do not, generally speaking, give reliable results in the hands of the ordinary skilled mechanic, and, as at present constructed, they are better placed in the laboratory than in the machine or fitting shop. It has already been pointed out that the indications of a dynamic balancing machine may be entirely masked by centrifugal distortion.

An item of balancing which is of dynamic character, though not dynamic balancing in the sense of the present discussion, is that necessary to determine the moment of inertia of flywheels used in engines in which reverse rotation is employed. Where such flywheels can be made of identical design the matter is simplified, but where this is not possible some ready method of measuring the moment of inertia must be adopted. In connection with the early 12 horsepower Lanchester engine, the flywheels were tested by mounting them on a mandrel to which a pendulum was attached, and the



moment of inertia was calculated from the time period of the pendulum. This apparatus was only used for initially determining the flywheel design, and after the first pair of wheels had been standardized by the pendulum method, the drawings were corrected to suit.



We now pass to the consideration of vibration of a kind entirely different from that dealt with in the preceding sections, involving a departure from our initial hypothesis. We have to deal with vibrations due to want of

rigidity of the structural components of the engine. In the case of an engine having "looking glass" symmetry, such as the ordinary four-cylinder or six-cylinder engine, if we think of the engine as flexible about its middle point, as though the frame and crankshaft were articulated at that point, we can see that the two halves of the engine would rock in a symmetrical manner just as two separate two or three-cylinder components would do if built as separate engines. We can, therefore, see that any want of rigidity in the crankcase and structure of the engine would result in a vibratory bending of the engine itself under the influence of the reciprocating masses; this is one of the forms of vibration now contemplated.

In such a case as the above, and in practically all cases in which distortion of the engine components is concerned, it is quite easy to give the necessary strength to resist the vibratory motion and to prevent it from directly causing trouble; any reasonably good design will suffice for this purpose. The real difficulty arises when the vibration period due to this elasticity coincides with the running speed or with any periodic disturbance associated with the functioning of the engine. Thus, any natural vibration period in the engine structure may pick up the main piston period, or the octave piston period, or even one of the higher harmonics of the piston motion, or in some cases the impulse period may be the exciting cause, so that synchronization may take place at several different running speeds of the engine.

Cause of Vibration.

In certain respects vibration of the character now under discussion resembles the vibration set up in the chassis of a car by direct dynamic vibration of the engine of the type already discussed, and in the case of an engine fitted to a chassis it is frequently difficult to ascertain whether the synchronous vibration found to extend over a certain range of speed is due to resonance in the chassis or in the motor itself. A question of this kind, should it arise, frequently has to be settled by the removal of the motor to the test bench, when any critical period which relates to the resonance within the engine will remain without material alteration, whereas any due to resonance between the engine and chassis will be found to have disappeared, and possibly some new resonance periods will be found related to the natural period of the test bench or its appurtenances.

The period of a resonance within the engine frequently undergoes slight modification when the engine is transferred from a chassis to the test bench, owing to the difference in the rigidity of the mounting affecting the apparent stiffness of the engine itself. In this way it is sometimes found that a threshing point may be moved some 20 or 30 revolutions higher or lower in speed, or it may, in the one case, be found to have a range of some 30 or 40 revolutions only over which it is acute, or it may be found to come on gradually and extend over a range of, say, 100 revolutions per minute, e. g., an engine which on a chassis might show a vibration period ranging from 1400 to 1450 revolutions may, when removed to the test bench, be found to have a threshing point ranging from 1440 to 1540 revolutions; any variation of this character may at any time be expected. In spite of slight variations of this kind, it is usually possible clearly to distinguish threshing points due to internal engine resonance from chassis or test bench resonance; the former are found to be a characteristic of the engine, and soon become generally known as such by the testing staff.

The author has already pointed out that a number of different threshing points may be given by a single source of resonance in the engine, the exciting cause being a different time factor of the engine cycle; at the same time cases undoubtedly occur of multiple resonance in the engine structure; that is to say, it is quite possible for an engine to suffer both from a bending resonance and a crank torsional resonance; in fact, there is nothing actually to prevent a greater number of sources of resonance being present in one engine. Where a single source of resonance alone is present, the threshing points, that is to say, the speed at which they make themselves manifest, are usually found to bear a simple arithmetical relationship to each other, and in such cases the effect of the various factors—the main piston vibration, octave vibration and explosion frequency—may be detected coming successively into evidence as the speed is increased; in a six-cylinder engine it must be remembered that the explosion frequency is three per revolution, and so it is not uncommon in six-cylinder engines to find threshing points related in the relation of two and three or three and four. Where there is multiple resonance, the periods of the two sources may be related to one another by accident, but, ordinarily speaking, there will be no set numerical relation between them, but each source of resonance may have its own series of threshing points.

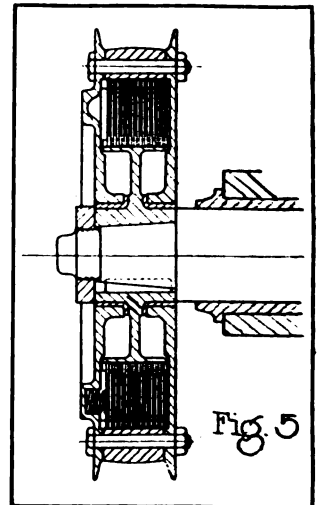
Eliminating Resonance.

When a new design of engine is under investigation, and it is established that undesirable resonance exists in the engine structure, it is important to ascertain as rapidly as possible its nature, with a view to elimination. The facts discussed in the foregoing section form the main basis of any investigation in this direction. Frequently additional light may be thrown on the subject by tests of the engine under full load and running light, or even belted round at speed, and it is usually not difficult to track down the cause of the trouble. At the present day most of the possible causes have been located, and we are in a position to know what to look for.

Where possible the most satisfactory solution to the difficulty lies in stiffening the parts to carry the period of resonance outside the range of the running speeds, that is to say, so to stiffen the structure of the engine as to make the resonant period above the frequency of any known disturbing cause at the maximum proposed running speed. This method may be said to be applicable to all questions of bending, and to the torsion of the body of the engine itself, but it is not conveniently applicable in the case of the crankshaft.

In the structure of the engine a well designed crank chamber and base is usually sufficient to give the engine the necessary rigidity in flexion; where a block cylinder is used, the rigidity of the engine in this respect can be made quite above question. In certain cases the question of bolting the cylinder groups one to another is worth consideration.

The torsional stiffness of the crankcase, owing to its tubular form, should be, and usually is, sufficient to prevent torsional vibration of the engine as a whole, but it is well to note that if the crankcase be considered a tubular member, the joint between the crankcase and the base must be made a thoroughly sound job. There is frequently a source of weakness here; the attachment bolts are often too light and too widely spaced to do more than act as a means of retaining oil. It should be remembered by the designer that the joint in question is in shear when the crankcase as a whole is in torsion, and either sufficient bolts should be provided to give a sound frictional grip capable of taking shear, or a sufficient number of the bolts should be made a dowel fit. The torsional stiffness of the engine also would be considerably aided by the bolting together of the cylinder groups.



By far the greatest trouble in multi-cylinder engines is on the score of torsional vibration, and in particular crankshaft torsion. At the present time, when this source of weakness has been so clearly established, the possibility of trouble from such a cause seems more than obvious, but it required a considerable amount of labor definitely to locate the disease from which the early six-cylinder engine suffered; it is unquestionably a fact that the popularity of the six-cylinder car was held back for many years by the vibration troubles which, for a time, were not properly understood. More than one firm attempted to market a six-cylinder car, but had for a time to admit failure.

It is difficult to deal with the question of crankshaft torsion solely by giving greater stiffness to the offending member, and the difficulty becomes greater as the stroke-bore ratio is increased. For engines of short stroke up to square proportions, that is to say, when the stroke becomes equal to the bore, it is not difficult to keep out of serious trouble by designing the crank for the maximum stiffness, but for long stroke engines, such as at the present time are in fashion, the crankshaft, if so designed, becomes excessive in weight and costly in bearing friction.

Crank Torsional Vibration.

Before going further, it is desirable to study carefully the exact nature of crank torsional vibration and the manner in which it makes itself felt on the bed of the engine. As a rudimentary model we may take the case of a length of shaft on which two flywheels are keyed. Such a system, which we may assume mounted in bearings, would have a vibration period proper to it, that is to say, that if the shaft were put in torsion and the wheels released, they would vibrate with a certain definite periodicity, the two wheels moving in opposite directions until the vibration is damped out by bearing friction and other causes.

In the six-cylinder engine we have a shaft to which is keyed one flywheel—we have no second flywheel, but we have in place of it a number of crank throws, with parts having considerable mass attached thereto; such a combination is evidently capable of behaving as a second flywheel, and the whole system has a capacity for vibration just as in the rudimentary illustration given.

A slight difficulty occurs in this comparison; the two-flywheel system mounted on the common shaft in bearings would be capable of vibration and torsion to any extent without communicating its vibration to its mounting; from a rotational point of view it is a self-contained system whose vibrations will not be communicated to anything without. In the case of the crankshaft, however, where the pistons form one of the vibrating masses, the vibrations are communicated to the frame of the engine by virtue of the restraint exercised by the cylinders and the connecting rod reactions during the vibratory motion, and so the crankshaft vibrations make themselves powerfully felt on the framework of the engine and its mounting.

Causes of Vibration.

The main exciting causes of torsional crank vibration are to be found in the torque variations, due, firstly, to inertia, and, secondly, to cylinder pressure; the first of these causes is that discussed in our analytical study of the one-cylinder engine, the torque reversal that takes place twice per revolution owing to the give and take of energy between the flywheel and the piston mass. This would manifest itself when the revolution speed of the engine is half the natural complete torsional period of the crankshaft, that is to say, the time of one revolution of the crankshaft is equal to two complete vibration periods of the crank in torsion. The second exciting cause in a six-cylinder engine (and it is here that torsional vibrations give the most trouble) occurs three times per revolution; that is to say, there are three explosion impulses per revolution, and thus the synchronous vibration will take place when one revolution of the engine corresponds to three complete periods of the crank in torsion. Consequently we may expect, in cases of torsional vibration, to have two marked threshing points having speed relation of two to three; the lower of these points will be that consequent on cylinder pressure, the higher of these points will be that due to piston inertia. It is a common experience of designers who have been troubled with six-cylinder engine vibration to have had two marked periods of the character mentioned.

The matter, however, is far from being as simple as set out in the previous section. There is no doubt that

the cylinder farthest from the flywheel, acting as it does on the tail of the crankshaft where its amplitude of motion is the greatest, is the dominant factor in stimulating vibration, but inasmuch as the inertia torque variations of the other pistons also take effect, and these are separated by intervals of a third of a revolution, the total influence is one of some complexity. However, if a number of curves be superposed as representing the piston inertia effect the correct amount out of phase, and if they be given values proportionally to their flywheel value, that is, proportional to the probable amplitude of the vibration, it will be found that the periodicity of the end cylinder predominates.

Changes in Noise.

Beyond the above, it will be found on more closely examining the problem that there is a torsional variation due to the octave component of the piston motion which we may expect to give a synchronous revolution speed half that of the main inertia torsion, so that if, for example, the threshing point due to the explosion torque be located at 1000 revolutions per minute, there will be a bad threshing due to the main piston inertia at 1500 revolutions, and the minor threshing point, due to the octave component piston inertia, at 750. Groups of this character are commonly met with.

In addition to well defined threshing points, or points of resonance, such as discussed, it is often noted in running the speed of an engine up (or letting it down) on the test stand, that there are, as it were, changes of voice at certain speeds, that is to say, changes in the character of the throb or noise; in most cases the author is inclined to attribute this to resonance of an incipient character where the natural damping of bearing oil films, etc., is sufficient to prevent anything in the nature of a defined vibration.

The author has found the solution to the torsional vibration trouble in a vibration damper attached to the tail or free end of the crankshaft. This damper, in the form fitted by the Daimler company, comprises a small flywheel mounted to rotate freely on bearings, and in driving connection with the crankshaft through a multi-disc clutch arranged in an oil bath, ordinary viscous cylinder oil being used as lubrication. The damper, so fitted, does not impede rotational motion in the smallest degree—it is carried round with the crankshaft without offering any resistance—but it forms an immediate and considerable resistance to anything in the nature of angular or torsional vibration. The construction of the damper will be seen from reference to Fig. 5. It is proportioned to render anything in the nature of a crank vibration "dead beat", that is to say, if the crank were twisted through a small angle and let go it would return at once to its state of equilibrium without repeated oscillation. To effect this, as is well known, the law of friction between the clutch surfaces should follow the viscous law of fluid friction; this is secured by the employment of a wide extent of surface, separated by thin films of viscid oil.

Effect of Valve Gearing.

One of the consequent troubles that has been experienced as due to crankshaft vibration has been the difficulty of driving valve gear satisfactorily from the tail end of the crankshaft; that is to say, from the end opposite to that on which the flywheel is placed. Since the introduction of the vibration damper, all difficulty on this score has entirely ceased. It will be understood that, although the vibration damper does not greatly affect the torsional yield of the crankshaft as due to any given impulse, it prevents the accumulation of amplitude; that is to say, we no longer have one disturbing impulse after another coming, so to speak, on the swing of the pendulum. In some cases undamped crankshafts have been known to acquire an amplitude of motion of several degrees owing to the accumulation of energy due to the synchronizing with the exciting vibration periods.

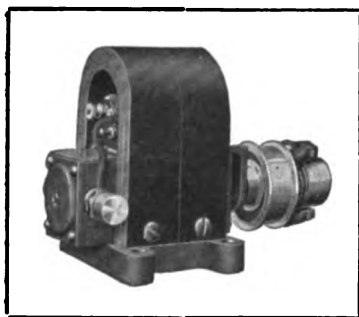
State Senator John Roy of Barnet and Attorney Gilbert A. Davis of Windsor have been appointed a commission by Governor Fletcher of Vermont to represent that state in a conference with a similar New Hampshire commission to act on the elimination of the tolls on 14 bridges over the Connecticut river between the two commonwealths.

During the closing hours of the 1914 session of the Rhode Island legislature an act was passed increasing the registration fees for commercial motor vehicles from \$2 to \$7.

LIGHTING SYSTEMS FOR THE USED CAR.

Factors Requiring Careful Consideration in the Selection of the Dynamo, Its Mounting and Drive---Suggestions for Installing a Moderately Priced Equipment.

MANY owners of used cars desiring to equip their machines with an electric lighting system, one providing means for illumination



Eureka, Jr., Type BC2 Dynamo.

when the motor is inoperative, upon ascertaining the probable cost of installation have decided that the expense was too great. Other owners practically decide upon a certain equipment without first ascertaining its adaptability to

the motor or the material required.

While there are motorists who equip their cars with electric lighting systems, there are many to whom the cost is an important factor. Many times an owner hesitates to expend \$100 or more upon an old machine even if it be in first class condition. This is especially true if it be planned to trade the car in the following spring.

Components of System.

In considering the installation of a lighting system those not familiar with its details are apt to overlook several factors. For the benefit of those contemplating such purchase the equipment necessary will be outlined. It will include the dynamo, and some makers list the cut-out, reverse relay, etc.—that member automatically connecting and disconnecting the generator with the storage battery—as extra. If it be desired to have a supply of current when the motor is inoperative, or in other words, when the dynamo is not generating, a storage battery will be necessary. While some generators are constructed to supply electricity direct to the lamps, the exclusion of the battery means the use of oil side and tail lights.

Two-Bulb Headlights.

While the wires are not expensive, they add to the cost, and a multiple switch will be needed. Some systems provide for an ammeter or a combination instrument. The lamp equipment may be simplified by utilizing headlights having a small bulb in addition to the regular member, an arrangement eliminating the expense of the side

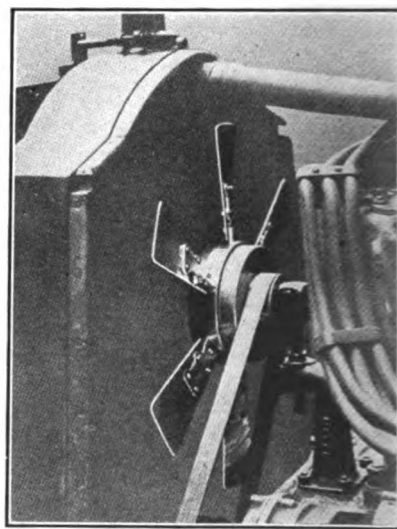
lamps. A tail light, however, will be required, and a new one can be purchased or the oil lamp converted into an electric unit. If it be desired to economize, the side and headlights may be fitted with converters. The writer favors the purchase of a new pair of headlights with the small bulb, and the converting of the tail lamp, as by this arrangement the wiring plan is greatly simplified. Some makers supply the complete equipment, while others furnish only the dynamo, believing that the choice of the lamps, etc., should be left to the motorist.

Mounting the Dynamo.

Having ascertained the cost of the material described, the mounting and drive of the dynamo is considered. Certain makers manufacture brackets for a number of standard type of machines, while others are prepared to submit instructions for mounting their product. Where ready made brackets, pulleys, sprockets, belts, chains, etc., can be obtained, the cost of the installation is considerably reduced.

These factors should be considered carefully, especially the mounting of the generator. It should not prove difficult or expensive on the average machine, and as previously stated, the manufacturer will offer valuable suggestions.

There are several practical lighting dynamos which may be purchased with cut-out, etc., for about \$30. Owing to the various types of lamps it is difficult to give other than an approximate cost, but the balance of the equipment should be obtained for at least \$25. Storage batteries are made in various capacities, each maker of a lighting dynamo recommending a certain type. The prices vary accordingly.



The Kemco Fan Type Generator Installed.

Henricks Dynamo.

Among the concerns making a specialty of lighting dynamos for the used car is the Henricks Novelty Company, Indianapolis, Ind. The Eureka generator is the result of considerable experimentation to develop a practical, moderately priced dynamo for the owner of a large or small machine.

That shown in an accompanying illustration is known as the Eureka, Jr., type BC2, and is specially adapted to the Ford, Maxwell, cycle-cars, etc. One of the qualities of the dynamo is that the price includes an automatic cut-out and a governor. The machine can be employed, if desired, for direct lighting, that is, without a storage battery, and is stated to supply sufficient current for 30 to 35 candlepower lamps in addition to ignition.

Function of Cut-Out.

The generator is of the permanent magnet type and the automatic cut-out is simply constructed, being placed between the magnets and operated by the governor. The cut-out is in the form of a switch which connects the dynamo to the battery when the speed of the generator is sufficient to provide an output of over six volts. The governor is of the centrifugal type and actuates the electric switch of the cut-out at the proper speed of the armature, preventing over-charging of the battery. It is pointed out that the speed of the armature is constant after attaining its maximum, regardless of that of the motor. The charging rate of the generator is 5.5 amperes.

Drive Optional.

The company manufactures brackets for mounting the dynamo on Ford and Maxwell motors, and states that its dimensions are such as to be attached to any power plant where there is room enough to provide a belt or friction drive. The V belt is recommended, but drive can be taken through sprockets and silent chain.

The Henricks Novelty Company produces several types of lighting dynamos, these ranging from \$20 to \$50, also lamps, bulbs, etc. The catalogue describes and illustrates the various designs and equipment and will be mailed free upon request.

Holtzer-Cabot System.

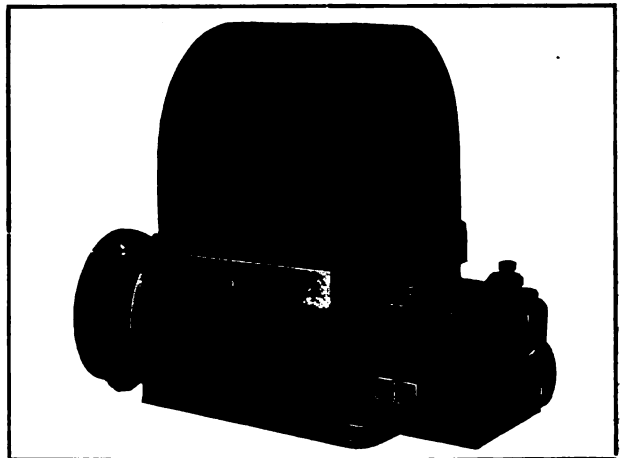
The Holtzer-Cabot JS type magneto generator, shown in an accompanying illustration, was described in the April 25 issue of The Automobile Journal. The magneto has an output of 5.5 amperes continuously at 6.5 volts; is of the permanent field type, very compact, and lists for less than \$25 without the reverse current relay,

which sells for \$3.50 extra. The Holtzer-Cabot Electric Company, Brookline, Mass., will mail free, on request, its booklet on lighting systems for the used car, and it contains many suggestions of value to the motorist contemplating the installation of a lighting dynamo.

Kemco Fan Type Generator.

A lighting generator, differing from conventional practise, in that it replaces the regular fan and is driven by the fan belt, is the Kemco, made by the Kemco Electric Manufacturing Company, 2209 Ashland road, Cleveland, O., and for which the Motor Parts Company, 185 Columbus avenue, Boston, is distributor.

As will be noted by an accompanying illustration the fan and generator are a unit. The output of the dynamo is stated to be sufficient to maintain a storage battery in a fully charged condition and to supply sufficient current for lighting, ignition and motor starting systems.



Holtzer-Cabot JS Type Magneto for Electric Lighting and Battery Charging.

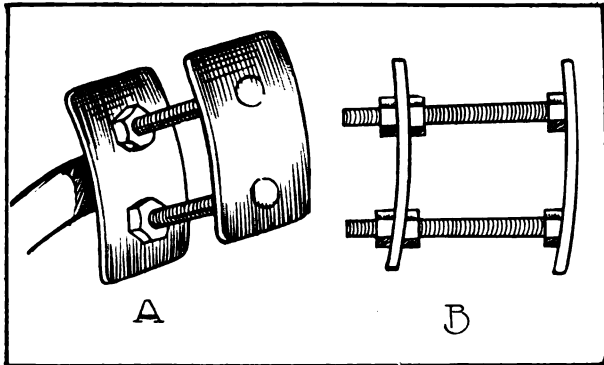
The simplicity of the installation is obvious. Both maker and distributor will supply complete details upon request.

W. J. Johnson of Chicago, Ill., has joined the sales force of the Connecticut Telephone & Electric Company, Meriden, Conn., maker of the well known Connecticut ignition products.

The Perkins Campbell Company, 622-626 Broadway, Cincinnati, O., is making announcement of its new Ford specialties and general catalogue, just coming from the press. The work devoted to Ford specialties covers the company's line of leather goods and seat covers for this car, and the general catalogue includes all leather specialties for automobile work. Either book will be sent upon application.

MECHANICAL NOTES FOR OWNERS.

WITHIN the last year the car manufacturer has been giving attention to minor details, many of which contribute to the comfort



Converting Clutch and Brake Pedals into Adjustable Members: A, the New Pad in Position; B, Showing How the Device Is Retained and Locked.

of the driver and passengers. The compact grouping of the control units and the convenient location of the gearshift lever, for example, make it possible for one to operate a machine for long distances over strange roads with a minimum of effort.

Much of the fatigue experienced by some owners is due to their not fitting the car. By this is meant that a driver below the average height, who rides the clutch and brake pedals, is unable to assume a comfortable position in the seat. To reach and depress the pedals fully he must sit away from the back of the seat, especially when operating in traffic where quick work is necessary. Of course this does not apply to all cars or drivers, but instances where the owner formed the habit of sitting on the edge of the seat are known to the writer, who recalls a particular case in which the operator attributed fatigue to the design of the springs.

The machine was an old model and to disengage the clutch it was necessary to depress it at least four inches. As a result the owner acquired the habit of sitting practically on the edge of the seat. Upon the advice of a repairman, who was consulted as to the advisability of fitting new springs or shock absorbers, the pedals were lengthened as shown in an accompanying illustration. To detach the pedals would have involved considerable labor and expense, so the repairman adopted a novel plan, one having the advantage of adjustment, as well as of not changing the original design.

The face of the pedal was drilled to take two good sized bolts and the latter were threaded to

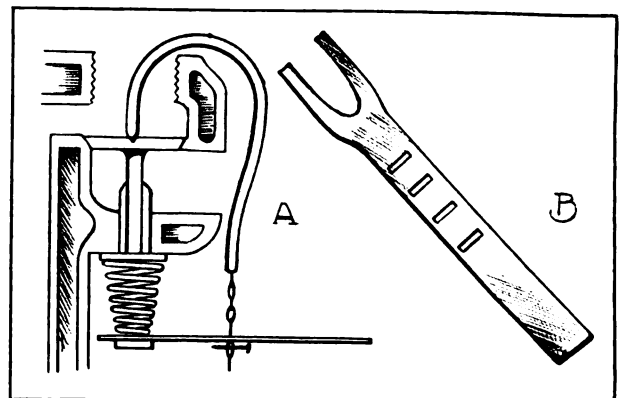
within .125 inch of the head. The bolts were then placed in a lathe and the square heads turned round and chamfered much in the same manner as an ordinary wood screw.

Two new footpads were constructed of .25-inch stock, the old members being utilized for a pattern, and drilled to take the threaded bolt. The holes were countersunk to fit the bolt heads. After placing the bolts in the pad, a nut and a lock washer were run up on the underside and screwed up snugly. A second nut was then placed on the bolts and the assembly fitted to the old pedals as shown in the drawing. The new members were locked securely by a nut on the portion of the bolt extending through the old pads.

At first the maximum position was utilized, but it was found that better results were obtained by shortening the distance between the pads, which was accomplished easily by slacking off the nuts on top of the old pads and screwing up on the locking members. While two pads did not make as neat an appearance as a single member, the owner found that he could sit well back in the seat, and did not experience the fatigue previously mentioned.

MAKING A VALVE LIFTER.

The average valve lifter will not fit all motors, although there are several marketed which can be universally used. Generally the owner purchases one that is best adapted to his engine, but if the car is sold and another purchased the tool may not be adaptable to the new machine.



Home Made Valve Lifter Adapted to Fit Practically Any Type of Motor: A, Showing the Tool in Position; B, the Lever, Having Slots to Obtain Varying Positions.

A practical valve lifter may be made at a slight expense, as the stock required could be purchased for a few cents. The design shown in

an accompanying illustration was constructed by a mechanic who was awarded the first prize in the weekly contest conducted by the Commercial Motor, an English publication.

To make the tool a piece of steel about 15 inches long, .75 inch wide and .3125 inch thick is necessary. One end is cut in the shape of a fork, as indicated at B in the drawing. Next cut four slots, equidistant. The holes can be made by using a breast drill, then breaking out the walls with a small cold chisel, after which the apertures can be smoothed up with a file.

The fulcrum member shown in position at A can be constructed from an iron rod about 15 inches long and approximately .5 inch in diameter. It is bent to the shape indicated, and the end coming in contact with the valve head is filed tooth shaped so that it will fit the slot in the valve head. It could be made pointed if desired, depending upon the type of valve. To the lower end of the hook member is attached a chain.

The method of using this valve lifter is simple. The valve plug is displaced from the cylinder and the hook inserted as shown at A. The lever member B is then employed in the conventional manner, and the chain passed through an opening, one best adapted to obtain the desired leverage. The chain is prevented from leaving the lever by a small pin.

The advantages of this valve lifter are obvious. The hook resting on the head of the valve prevents the latter from rising when the spring is compressed, and the slots and chain make it possible to change the position of the tool to meet the requirements of different motors, as well as to operate the lifter in different positions.

"BEST IN THE LONG RUN".

B. F. Goodrich Company Cites a Concrete Instance to Prove This Slogan.

For sometime past the B. F. Goodrich Company, Akron, O., has been advertising that Goodrich tires were "best in the long run". Recently Louis Black, vice president of the Bailey Company, Cleveland, O., sent the company a photograph of a tire which had seen 9000 miles of service, and to which special attention was drawn because of the character of the accident which put the casing temporarily out of service at that point. The accompanying letter follows:

This tire was surely out for a record when at 9000 miles a piece of broken auto spring found its way into the tough tread. Nine thousand miles is some record at that, but I am going right on for more mileage on this tire, as the Goodrich repair department has repaired

the cut so well that I believe there are yet many miles of service in the tire. I always get exceptional mileage out of Goodrich tires and have never yet had to ask the B. F. Goodrich Company for an adjustment.

THAT "SERVICITIS" GERM.

Moline Automobile Company Gives Valuable Advice to Dealers and Owners.

L. M. Bradley, director of advertising for the Moline Automobile Company, East Moline, Ill., has addressed an interesting bulletin to all Moline-Knight dealers and agents. The title is "That 'Servicitis' Germ", and the subject is one which has given the industry much occasion for serious thought. In fact, a movement already has been started by the National Automobile Chamber of Commerce in an effort to determine just what service should mean. Because the subject is one to which the owner and prospective owner should give some thought, a portion of Mr. Bradley's bulletin is reproduced herewith.

Of all the words in the motor car language that have been abused, maligned, distorted and twisted, service stands out predominant. Service is the gutta serena word that has rung the death knell of thousands of dealers. It has wiped away their profits and put many a receiver into a job.

Service has made gray hairs grow where dark hairs grew before. It has driven dealer after dealer out of the motor car business entirely, or into the accessory line, or made him a garage proprietor. It has put him onto the road selling goods for someone else, rather than hustling for himself—anything to get away from the word service as now interpreted by motor car owners.

Five years ago service meant a "square deal" to the maker, the dealer and the consumer—and all were satisfied. Today the general public's interpretation of service is "getting all I can for nothing—plus". Motor car owners have, year after year, become more persistent in their demands upon the dealer as to "taking care" of the car after it is sold. There is no class of people in the world that expects so much for nothing as motor car owners.

When a man purchases a motor car he labors under the impression that the sale is all velvet for the dealer, and because he has favored the dealer with an order, he is forever and everlastingly under obligation to him. The buyer does not seem to take into consideration that the dealer has rent to pay, has a pay roll to meet and has the 101 office incidentals just like the man who has purchased the car.

This condition does not exist in any other business. It is a condition that has been brought about not only by the motor car purchaser, but by the dealer. A large proportion of dealers are salesmen and not business men. Many dealers are so anxious to make a sale or so anxious to keep that sale away from a competitor that they throw all business acumen to the winds.

The matter of service, I believe, is a condition that must be adjusted. The motor car buyer must, from necessity, be educated to the fact that the dealer cannot, day in and day out, week after week, take care of the purchaser's car when the breakage or wear is not due to poor workmanship or material.

If a dealer is not making a legitimate profit, and if, after a thorough investigation, he determines that it is a case of "servicitis", it is up to him to rid himself of that disease. He can blame no one but himself if he is going beyond the warranty of the manufacturer. All leading manufacturers have adopted the 90-day warranty as promulgated by the National Automobile Chamber of Commerce. This warranty is standard, it is equitable, and is as fair and square as any motor car manufacturer in the industry can place on his product.

IMPROVED ROADS AND MOTORING LAWS.

Combined Appropriations for 1914 Indicate That \$176,000,000 Will Be Available for Highway Work in the 48 States of the Union During Current Year.

HOW much money is being expended annually for improved highways throughout the United States? It is somewhat difficult to arrive at a definite answer to this problem. Some states are committed to a state aid plan, under which the various counties, districts and towns are required to appropriate certain sums in order to secure the benefit of funds appropriated by the legislature. Other states are working under a state highway plan, in which the amount appropriated by the legislature is expended without regard to any amount contributed by local subdivisions. Still other states are committed to

The amounts which will be expended by counties, districts and townships also are presented in an accompanying table. In most instances these figures are obtained from estimates supplied by highway authorities and published in the year book of the American Highway Association. The office of public roads finds that \$135,739,320 was expended by these local subdivisions in 1912, and it is estimated by that body that such funds are increasing at the rate of about 10 per cent. a year, from which it is suggested that something like \$175,000,000 will be available in 1914. The figures from the year

DETAILED LIST OF STATE, COUNTY, DISTRICT AND TOWN APPROPRIATIONS.

	State	Local	Total		State	Local	Total
Alabama	\$267,165	\$2,100,000	\$2,367,165	Nevada	†150,000	150,000	
Arizona	*258,577	535,724	794,301	New Hampshire	362,739	†1,000,000	1,362,739
Arkansas	25,000	1,163,000	1,188,000	New Jersey	†750,000	†3,000,000	3,750,000
California	5,000,000	†10,000,000	15,000,000	New Mexico	120,000	266,738	386,738
Colorado	375,000	1,250,000	1,625,000	New York	14,000,000	†7,000,000	21,000,000
Connecticut	†1,000,000	1,250,000	2,250,000	North Carolina	5,000	†2,000,000	2,005,000
Delaware	30,000	110,000	140,000	North Dakota		2,365,000	2,365,000
Florida .....	...	2,665,000	2,665,000	Ohio	3,500,000	2,625,000	6,125,000
Georgia	**	2,750,000	2,750,000	Oklahoma	5,000	4,000,000	4,005,000
Idaho	250,000	1,270,000	1,520,000	Oregon	238,000	4,000,000	4,238,000
Illinois	500,000	7,000,000	7,500,000	Pennsylvania	3,000,000	1,245,000	4,245,000
Indiana		4,705,797	4,705,797	Rhode Island	390,000	390,000	780,000
Iowa	60,000	7,250,000	7,310,000	South Carolina		1,000,000	1,000,000
Kansas	10,500	4,975,000	4,985,500	South Dakota		1,000,000	1,000,000
Kentucky	25,000	2,000,000	2,025,000	Tennessee	††	†2,750,000	2,750,000
Louisiana	130,000	†2,500,000	2,630,000	Texas		†6,000,000	6,000,000
Maine	1,100,000	1,815,000	2,915,000	Utah	100,000	100,000	200,000
Maryland	3,500,000	†1,000,000	4,500,000	Vermont	410,000	235,000	645,000
Massachusetts	2,447,000	9,000,000	11,447,000	Virginia	450,000	1,500,000	1,950,000
Michigan	1,070,000	4,183,972	5,253,972	Washington	1,500,000	2,789,806	4,289,806
Minnesota	1,400,000	4,272,254	5,672,254	West Virginia		2,268,558	2,268,558
Mississippi		1,720,000	1,720,000	Wisconsin	1,230,000	4,000,000	5,230,000
Missouri	300,000	†4,500,000	4,800,000	Wyoming	*3,000	500,000	503,000
Montana	10,000	2,060,000	2,070,000				
Nebraska	80,000	†2,000,000	2,080,000				
				Totals	\$43,901,981	\$132,260,849	\$176,162,830

*Also value of convict labor; †estimated on basis of amount expended during 1913; ‡estimate not included in report of United States office of public roads; **value of convict labor only; ††Tennessee has new state highway commission, but figures are not available.

both plans, and a few have no state highway funds.

The United States office of public roads has compiled figures setting forth the amounts available in the state funds for road work during 1914, which show a total of \$42,151,981. To these may be added \$1,000,000 for Connecticut and \$750,000 for New Jersey, which estimates are secured from other sources. This total of \$43,901,981 is held to be an authoritative estimate of the money which the states will expend during the year, although it will be augmented in some instances by bond issues, figures concerning which are not obtainable.

book of the American Highway Association, supplemented by estimates based on the amounts appropriated last year where such figures are not available, shows a total of \$132,260,849, which is less than the amount expended in 1912.

The grand total of the two columns of the table is \$176,162,830, or approximately the amount estimated by the United States office of public roads for the sub-divisions alone. The table is presented as perhaps the nearest approach to a definite compilation of improved highway funds ever made. It shows what each of the 48 states contemplates in the way of highway improvement during 1914.

In this connection, it is of interest to note (quoting again from the year book of the American Highway Association) that the figures reported from the various states show that \$177,537,783 was expended for this purpose in 1913. To this figure the editor of that work adds eight per cent. for increase in local expenditures in 1913 over 1912, where exact figures are not available, giving a total of \$191,739,783. The office of public roads estimates the value of statute labor, in addition to cash, at \$15,000,000, giving a grand total of \$206,739,783.

According to the office of public roads, the 48 states had expended \$106,600,000 of state funds in improved highway construction previous to Dec. 31, 1911. There was available, according to the best information, \$43,819,138 in such funds during 1912, and \$45,024,816 in 1913. It is estimated, however, that only approximately \$155,000,000 in state funds had been expended prior to Dec. 31, 1913, of which some \$19,000,000 was expended in 1912 and \$26,600,000 in 1913. It would appear, therefore, that instead of increasing appropriations for highway construction the states are carrying over a large proportion of these funds from year to year, and that some \$24,000,000 of the \$45,000,000 available in 1913 was thus brought over from 1912. How large a proportion of the \$44,000,000 in state funds available for this year is made up in this manner is not known, but from the above figures it would appear that it is at least \$18,000,000.

CONNECTICUT ROAD PLAN.

Comprehensive Scheme Outlined as Result of Conference with Highway Commissioner.

As the result of a number of conferences between State Highway Commissioner Bennett of Connecticut and a committee representing the Connecticut Good Roads Association, a programme has been adopted, which will be presented to the legislature in January, looking toward a more definite plan for road construction and maintenance. The proposition is fully set forth in the following platform:

1—That we approve the suggestion of Commissioner Bennett that the state must appropriate at least \$3,500,000 for the purposes set forth in his letter to Governor Baldwin.

2—That the money spent in surfacing trunk line roads be expended in permanent pavements.

3—That we favor a bond issue in the amount of \$2,000,000, the proceeds to be expended for purposes of grading, straightening and for building culverts upon trunk line roads at present unimproved, as for example, the trunk line from Hartford to Colchester to New London, and the trunk line from Middletown to Colchester to Willimantic.

4—That we recommend that the state build no more

water bound macadam roads upon the trunk lines, but in the absence of sufficient funds to place a permanent pavement on state roads shall use a gravel surface where possible or leave the road as a well drained dirt road.

5—That we approve the idea of Mr. Bennett that the highway commissioner should be empowered to condemn land for highway purposes; that a proper method of compensating any property owner who is damaged thereby should be provided, and further, that the highway law should be codified so that the same may be uncontradictory of itself and readily understood and applied.

In his letter to Governor Baldwin, Commissioner Bennett set forth that substantially 1420 miles of highway were included in the trunk line system, of which 900 miles have been improved in a more or less permanent manner at a cost of approximately \$10,000,000. Estimating the cost at about \$15,000 a mile, he finds that it will require a further expenditure of \$7,800,000 to complete the remainder. He adds that about \$900,000 a year will be needed for maintenance of trunk line roads already built and badly worn, of which the motorists will pay into the treasury this year approximately \$400,000, leaving a deficit of \$500,000 that must be furnished by the state. He also finds that \$500,000 a year seems to be necessary for the renewal of roads that were cheaply constructed at the beginning, this reconstruction work probably to extend over a period of eight years. He sums up the various necessary expenditures as follows:

Repairs to trunk lines, not including automobile fees	\$500,000
Renewals and construction of trunk lines.....	500,000
State aid roads.....	500,000
Repairs to state aid roads.....	150,000
Engineering and operating department.....	100,000
Total for one year	\$1,750,000
Or, for the fiscal term of two years.....	\$3,500,000

BRIEF NEWS NOTES.

The board of supervisors of Greene county, Iowa, has appropriated \$15,000, to which \$5000 will be added by the Greene County Lincoln Highway Association, for the construction of a 26-foot road across the country, on the line of the Lincoln highway, this year.

M. E. Placek, president of the Nebraska Culvert & Manufacturing Company, has contributed \$1000 worth of corrugated American ingot iron culverts to be used on the Lincoln highway in Nebraska.

Residents of Elkhart county, Indiana, have made arrangements to construct 27 miles of road, brick on concrete, on the Lincoln highway route in that county. The movement was started by John C. Boss and J. W. Fieldhouse, who will build that portion across Bango township at their own expense.

A highway costing \$2,000,000 will be completed between San Francisco and Los Angeles, in time for the opening of the Panama-Pacific exposition next year. If plans of men in each city are adopted. These include setting aside \$2,000,000 of state highway bonds, of which Los Angeles is expected to take \$1,300,000, the remainder to be taken up by the counties interested.

The Toledo Automobile Club, Toledo, O., is interested in a proposition to introduce a bill in the Ohio legislature next year, requiring horse drawn vehicles using the highways during the hours of darkness to display a red light. Other clubs, including some which are not affiliated with the Ohio State Automobile Association, have taken steps looking toward amending the present motoring statute by substituting a green light for the red light now required on motor vehicles.

WILLYS ON RATE INCREASE.

Writes Interstate Commerce Commission That He Approves Such Action.

In view of the numerous objections which have been filed by manufacturers and business men against the proposed increase in freight rates authorized by the Interstate Commerce Commission, it will prove of interest to note that at least one man prominent in the automobile industry indorses the action of that body. This man is John N. Willys, president of the Willys-Overland Company, Toledo, O., and head of half a dozen other big concerns in the industry. He writes the commission as follows:

After considering from every angle the matter now before your honorable body, pertaining to the general increase in rates, I am constrained to write and express to you my belief in the advisability of such action. I am convinced that conditions warrant it and that carriers are entitled to a larger revenue for the service they perform.

So I would respectfully ask to be placed on record as not only not objecting to the increase, but as strictly advocating it, notwithstanding the fact that it will mean a large increase in the expenses of my company.

I might add that the Willys-Overland company and the several companies owned by it and myself, making parts for Overland cars, are, as you doubtless are aware, heavy shippers. The Willys-Overland company alone ships and receives approximately 16,000 carloads per annum, and pays freight charges on inbound carload shipments, exclusive of coal, oil and lumber, considerably over \$200,000 per annum.

FOREIGN TRADE CONVENTION.

American Manufacturers' Export Association Calls a Meeting in Washington.

With a tariff held to have been designed to throw American industry into world wide competition, important problems relating to the sale of American products abroad are believed to demand such attention that steps have been taken to hold a national foreign trade convention in Washington, D. C., May 27-28. The call is issued by the American Manufacturers' Export Association, co-operating with the American Asiatic Association and the Pan-American Society.

The general committee is headed by Hon. Lloyd C. Griscom, formerly ambassador to Italy and Japan. Secretary Redfield of the Department of Commerce will open the convention. The importance of foreign trade to the railroads will be the subject of a paper by Fairfax Harrison, president of the Southern railway. H. G. Herget, president of the Illinois Manufacturers' Association will treat of the situation in the Middle West. Others who will speak and their subjects, so far as they have been announced, are:

E. N. Hurley, vice president of the Illinois Manufacturers' Association, "The Panama Canal and Latin-American Trade Opportunities"; Alba B. Johnson, Philadelphia, "The Possibilities of Stimulating American Exports by a Larger Use of Raw Materials from Partially Developed Countries"; James A. Farrell, president, United States Steel Corporation, and E. C. Simons, head of one of the largest hardware houses in the country.

It is expected that delegates will be present to represent each of the many industries interested in foreign trade.

LYONS-ATLAS A MEMBER.

National Automobile Chamber of Commerce Directors Hold May Meeting.

The Lyons-Atlas Company, Indianapolis, Ind., maker of the Lyons-Knight car, was admitted to membership in the National Automobile Chamber of Commerce, at the meeting of its board of directors in New York City, May 6. The company will be represented in the organization by its president, James W. Lyons.

The directors also decided to co-operate with the American Automobile Association in the promotion of touring during the national automobile touring week scheduled for the last of June, and also to encourage the promotion of week-end tours by automobile clubs. It is expected that a plan will be decided upon arranging for a medal or certificate to be awarded by the American Automobile Association to car owners who shall participate in the three week-end tours to be scheduled.

There was an interesting report from the patents committee, and from the committees on legislation, traffic, shows and roads. For the last named committee, R. D. Chapin reported an increasing interest among the various highway commissioners in the need for more substantial pavements on the main highways, such as brick or concrete, as a result of the excellent service the concrete roads of Wayne county, Michigan, have been giving for the past few years.

Those in attendance at the meeting were: Charles Clifton, Pierce-Arrow; L. H. Kittredge, Peerless; William E. Metzger, Argo; C. C. Hanch, Marmon; Albert L. Pope, Pope-Hartford; H. H. Rice, Waverley; Wilfred C. Leland, Cadillac; Alvan Macauley, Packard; R. D. Chapin, Hudson; Windsor T. White, White; John N. Willys, Overland, and Alfred Reeves, general manager.

NEW CONNECTICUT AUTOMATIC IGNITER.

ANNOUNCEMENT is made by the Connecticut Telephone & Electric Company, Meriden, Conn., of a new ignition system termed the Connecticut automatic igniter, which apparatus was subjected to severe road and laboratory tests before being placed upon the market. It is designed to be used with batteries, either dry cells or storage, and includes a combined timer and distributor and a step-up or transformer coil with an automatic switch which cuts off the current in case the motor should stop with the circuit closed, thus preventing discharge of the battery.

The system presents many interesting features, the most prominent of which are the switch, the elimination of mechanical or electrical lag, and the method of insuring synchronization of the spark. The advantages stated by the maker, in addition to the above, are: A mechanical and synchronized break of the primary current; a large, hot spark with a

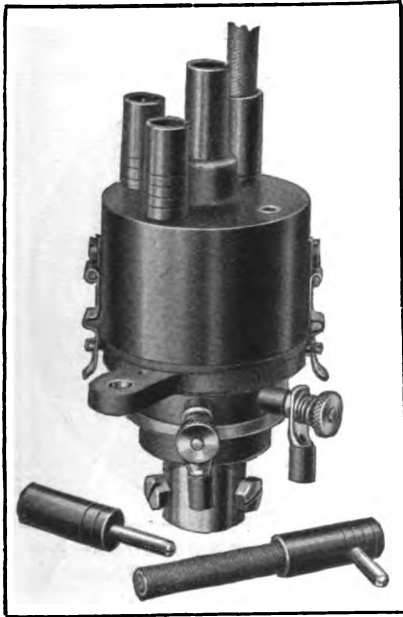


Fig. 1—The Connecticut Igniter Assembled.

minimum consumption of current; a practically fool proof construction, one that can only be assembled as intended, and durability.

It is stated that the igniter produces its hottest spark on the slowest motor speeds, and that it increases as the speed decreases, although the spark is much more than ordinarily intense at high speeds. This makes possible easy starting and throttling the motor to very low speeds without sacrificing efficiency, as the propagation of the flame is very rapid.

The igniter, which is supplied either with vertical or horizontal terminals, is very compact, the overall dimensions of a four-cylinder unit being slightly over four inches high and 2.75 wide. The timer and distributor assembled is

shown at Fig. 1. Fig. 2 depicts the device with the distributor cap displaced, while Fig. 4 shows the apparatus completely disassembled.

Referring to the last named illustration, also Fig. 3, it will be seen that the shaft has four longitudinally ribs, equidistant, which act as lifters for the breaker lever. The last named member is in the form of a semi-circle, and by referring to Fig. 3 it will be

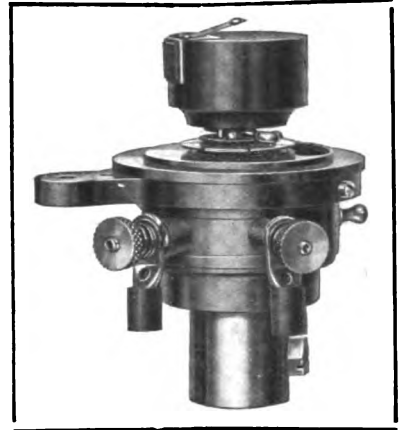


Fig. 2—Igniter with Distributor Cap Removed.

seen that the arm is pivoted at one end and has a platinum contact point at the other. The hardened and ground steel roller at the centre is actuated by the shaft ribs, the latter moving the lever and causing separation of the platinum contact points. The breaking of the contact interrupts the primary current and the method is similar to that utilized with magnetos. The breaker arm is well insulated from the base, the points ample in size, and it is stated that no engine ground is necessary in the primary circuit, as its winding is insulated from the secondary ground in the coil. The advantage of the design emphasized is that there is no possibility of the ignition system being affected through any short circuiting of any other electrical circuit, such as the lighting system, for example.

A cap or cover is fitted, carrying at its centre a bearing for the extended

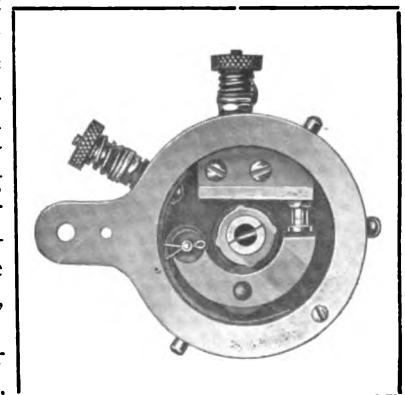


Fig. 3—Dust Cover Removed from Igniter to Show Interrupter and Cam.

shaft; a dowel in the timer case, entering a hole in the cover, makes it impossible to replace the cover other than correctly. A mica window

over the contact points permits of viewing them while running. The cover is retained by a split pin above it. A spring washer constructed of

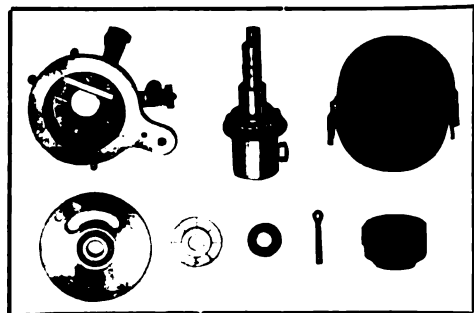


Fig. 4—Showing Igniter Used with E and G Systems Completely Disassembled.

proper tension, and an anti-friction washer is interposed between the spring washer and the top of the timer cover.

The distributor consists of a central cylinder of insulating material impervious to heat or moisture, and is carried at the top of the shaft, which is cut away where it enters the rotor and fits into a hole of corresponding shape, thus obtaining a drive. The arrangement absolutely prevents improper assembling. Located in the periphery of the rotor is a radial carbon distributing brush, which is pressed outward by a light spring in a recess in the rotor. Connection or passage of the secondary current from the coil to the distributor arm is by means of a light, flat steel spring on the top of the rotor.

The same insulating material as is used in the rotor is employed for the distributor housing,

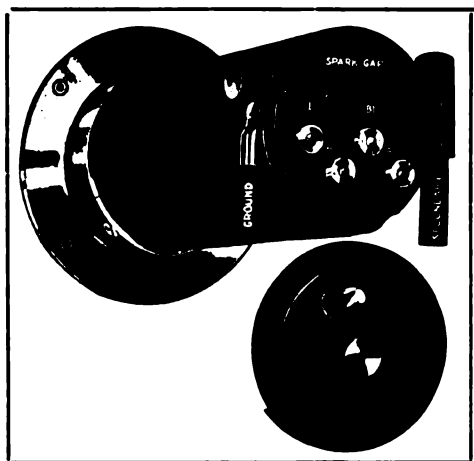


Fig. 5—Type E Combined Coil and Switch with Cover Removed to Show Terminal Connections.

fired. The contacts are connected to terminals which may be either vertical or horizontal, as previously mentioned, these details being

two small saucer shaped steel members put together with concave sides facing inwardly maintains the

and imbedded in its inner walls are the contacts, these being two, three, four or six, according to the type of igniter and the number of cylinders to be

specified when ordering the equipment.

The switch shown at Fig. 6 is most ingenious. It will be seen that it is provided with three buttons. One is for the battery and another for the magneto, in case a dual system is utilized, or for two sets of batteries. The third member is a releasing button, which automatically throws out any button pushed in, thereby cutting off the current supply. There is ample space between the buttons, permitting their operation with the hand or foot, and the construction is rugged.

The plungers on which the buttons are mounted operate through holes in a plate inside the cover plate; the perforated plate is pivoted and a spring keeps it normally pressed in one direction. When a switch button is pressed the conically shaped end of its plunger slightly swings the plate, which then snaps into a notch under the cone, holding the button down and keeping the circuit closed. When the releasing button is pressed its cone actuates the plate sufficiently to slip it out of the notch in the switch button that has been in engagement, allowing it to move upward.

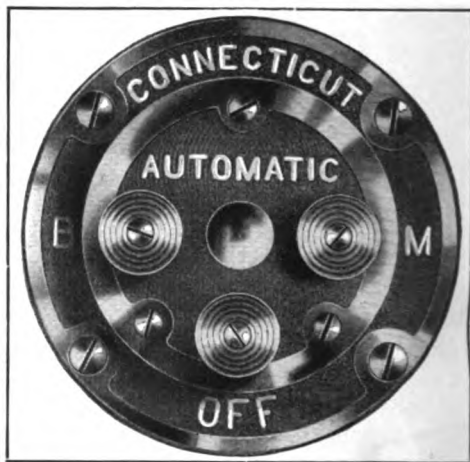


Fig. 6—Front View of Automatic Switch, a Standard Flush Dash Type.

Mounted on the swinging plate is a sliding bar, the ends of which reach the cones of the button plungers. The length of the plate is such that when one button is pressed, the cone moves it out of the way, that is, towards the cone of the opposite button, and the plunger can be depressed all the way. If, however, both are pressed at the same time, both are blocked by the sliding plate, which is too long to allow both to go down together.

The automatic feature referred to, which throws out the switch disconnecting the battery in the event the operator of the car fails to do so, consists of a vibrator of the electric ball type, the hammer of which strikes the edge of the plate referred to in the description of the

switch, pushing it out of the plunger notch. The current operating the vibrator is cut in by a thermostat, a mechanism that has been employed for many years in Connecticut telephone switches. The thermostat, when heated by a continuous and abnormal flow of current, establishes a contact, the vibrator becomes active, operating the switch, which is released in a fraction of a second, cutting off the current supply. Upon the thermostat cooling, which requires but little time, it returns to its normal position.

It is stated that the time required for the thermostat is controllable by a regulating screw. Ordinarily it is so adjusted that if the timer is short circuited when the driver closes the switch to start the engine, 30 seconds will elapse before the switch is automatically thrown out, allowing sufficient time to start to crank the motor.

The coil utilized with the type E system is shown at Fig. 8. It is of the flush dash type, and extreme care has been taken in the design of the connections and to make the case impervious to heat, etc. It will be noted that a spark gap is incorporated to protect the secondary windings from damage in case a plug terminal becomes disconnected. The gap is enclosed in a glass tube, is easily observed, and is not accessible to fuel vapor, making for a large factor of safety.

The types manufactured comprise the following: E, including the type S igniter and E coil; G, S igniter and G coil; EJ, J igniter and E coil; GJ, J igniter, G coil and type G switch. A feature of the J instrument is that it requires no lubrication of any kind. The company in designing the system had in mind the practise of the average owner to neglect to lubricate a timer, and the bottom bearing for the shaft and the bearing in the timer cover are of a substance formed by mixing graphite and babbitt when the metal is in a molten state. The mixture is subjected to an enormous pressure, and bushings made of it run without lubrication.

Laboratory tests of the Connecticut system are interesting. It has been demonstrated that it eliminates electrical lag; that is to say, there is

no discoverable interval between the interruption of the primary current and the occurrence of the spark at the plug. It is stated that this holds true at all speeds.

It is claimed that the system operating with a fixed spark is productive of more electrical energy than a magneto manually controlled. According to charts there is a remarkable absence of electrical lag. The company believes that with a system free from lag only two positions are necessary, one for safety as when starting, and one for running. It is held that mechanical lag has been overcome in the timer, as the lifting cam acts directly on the breaker arm; that springs, etc., are eliminated, and that the action is not affected by centrifugal force.

The wiring plans for the type G and GJ systems, also for E or EJ, are shown at Fig. 7. If emergency dry cells are not used with the first named system the lead to battery post No. 2 is

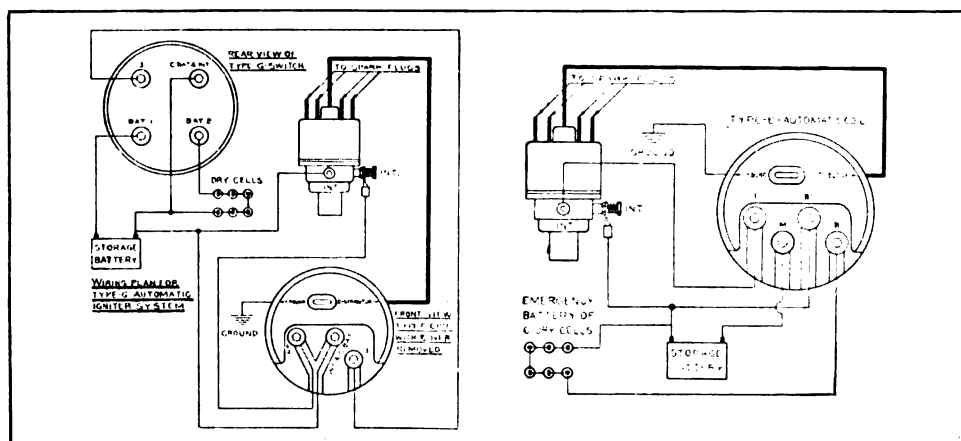


Fig. 7—Wiring Plans of Connecticut System: At Left, Plan for Type G or GJ; at Right, for Type E or EJ.

eliminated. The post B in the E or EJ system is not wired when cells are dispensed with.

As previously pointed out the Connecticut system is especially adapted to cars equipped with lighting dynamos maintaining a storage battery in a properly charged condition. The cost of the four and six-cylinder system is moderate, and the same high grade material and workmanship for which the products of this concern are noted are incorporated.

James App, formerly assistant general manager of the Cartecar Company, Pontiac, Mich., and more recently purchasing agent for the Chevrolet Motor Car Company, Flint, Mich., has become purchasing agent for the LaVigne Cyclecar Company, Detroit, with offices at 521 Lincoln avenue.

MACHINERY, TOOLS, EQUIPMENT AND SUPPLIES.

The Stevens Manufacturing & Supply Company, Fisher building, Chicago, is marketing the Stevens auto tire check valve, shown in complete form and with the dust cap removed in the accompanying illustrations, which are of actual size. One of the qualities of the design is its simplicity, there being but four parts as compared with 11 in conventional types. The maker points out that there are no springs to wear out; that the action is positive, and that the greater the air pressure in the tire the tighter the valve is closed.

One of the features of the Stevens is that the valve operates the full length of the pump compression stroke.



Stevens Auto Tire Valve.

This makes inflating tires easy and insures the proper pressure because of the ease of operation. It is also stated that a child can operate the pump with one hand when Stevens valves are fitted.

The device consists of a hexagon brass barrel with a thread cut on the small end to fit any standard pump connection. The other end is tapped to screw onto the valve stem, and has a channel

through the entire length of the barrel for the passage of the air. The hexagon chamber is taper bored for a rubber plunger, and the chamber is machined true and smooth on the inside to permit the plunger to move freely. A fibre washer prevents air from leaking.

The Stevens can be applied to any valve stem and the maker states that they are used by leading racing drivers. They retail for \$1 the set and are accompanied by a 30-day trial guarantee. Agencies are wanted in all unassigned territory. Terms and discounts will be supplied upon request.

The Rub-On Manufacturing Company, 89 Brayton street, Buffalo, N. Y., is marketing a number of preparations for renewing shabby parts of the automobile, these including restoratives for the top, upholstery, etc. Among these is Rub-R-Tite, which provides a black, water proof, flexible coating for a top, one that will not crack in zero weather, it is stated. The preparation is easy to apply. It comes in various sizes and is adapted for mohair, leather or rubber, and imitations of these materials.

The company also manufactures Rub-On concentrated lining dye, which is prepared especially for tops that have become discolored through neglect or long service. It is applied with a sponge, and it is stated that it is impervious to water and that it will not injure the material. It comes in black only.

Col-R-ol is for renewing the appearance of either leather or imitation cushions and upholstery. It is claimed that it gives a fast, water proof color to the material to which it is applied and that it will dry quickly. It re-dyes the same or a darker color, and comes in black, green, maroon, red or tan.



Adjusting the Auto-Turn Jack.

The elastic or Rub-On varnish is colorless and is for restoring the finish of the body, etc. Gloss Film is also produced by the company, a paste that puts a transparent smooth film over the varnish, thus preserving it.

Sta-Fix radiator mend, as the name implies, is for repairing leaks in the radiator. It stops leaks by forming a hard cement when the fluid becomes exposed to the air. It is mixed with the cooling fluid.

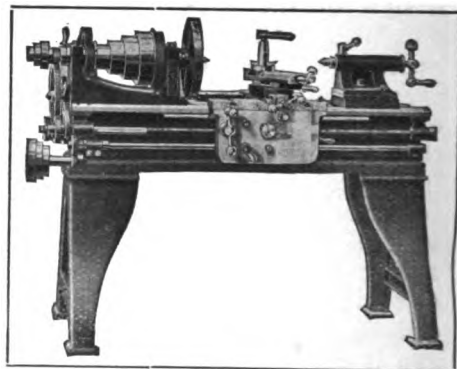
The Stay-On enamel produced by this concern is adaptable for metals and with it a hard, semi-bright, black finish is obtained. It will dry thoroughly when exposed to the air or it may be baked on, as desired. It is applicable to all metal parts of the machine, such as lamps, fenders, radiator, hood, etc., and is held to be very durable and lasting.

The Rub-On Manufacturing Company is also marketing the Auto Turn Jack, by means of which one person can raise the heaviest car easily and place it in the desired location. It is designed to economize space in the garage, as well as to save considerable labor. It has an instant adjustment for all heights of axles, and the length of the handle is five feet. It fulfills practically the same function as a turntable and is placed under a machine very quickly and from different angles. Tipping up the jack handle and lowering the lifting post permit placing the jack under an axle, while pulling down the long handle, causing the jack wheels to run under the machine's axle past dead centre, raises its front end. The company has a free cabinet proposition which will be mailed with complete data on its line, as well as prices.

The Sebastian Lathe Company, 125 Culvert street, Cincinnati, O., is issuing its new catalogue of high grade engine lathes, tools and attachments for automobile and general repair work.

The booklet is finely illustrated and contains complete descriptions of the lathes, and their attachments, as well as dimensions, prices, etc.

The engine lathes are built from entirely new patterns and designs, and are modern and



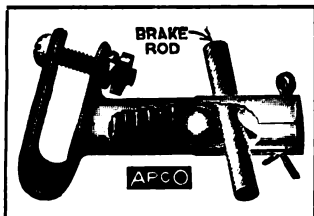
Sebastian Lathe.

practical in every particular. Special care is given in their construction, and the best of workmanship and high grade material are incorporated. The company builds lathes for manufacturing, jobbing, or the repair shop, and a number of designs especially adapted for the automobile manufacturer and the garage. A postal addressed to the company will bring the catalogue referred to, in which full particulars are given.

The International Metal Polish Company, Indianapolis, Ind., maker of Blue Ribbon metal polish, nickel polish, auto body gloss and radiator cement, has brought out a new article termed the Blue Ribbon cold cream soap. Among the features of the new soap is that it contains no grit and the use of water is not required. It is also stated that it leaves the hands soft and clean, and that chapped hands are avoided because of the absence of water. The company anticipates a large demand for cold cream soap by the owners, and is prepared to supply the trade, which can obtain complete details, as well as a sample, by writing the factory or the New York office, 335 Broadway. The full size can of cold cream soap retails for 10 cents.

Splitdorf Electrical Company, Newark, N. J., maker of the well known line of Splitdorf ignition, is manufacturing a magneto equipment for the model T Ford car. One of the qualities of the system is that the magneto is driven by enclosed gears and these members are assured of proper lubrication. The company issues a booklet entitled "Ford Power Possibilities", describing the system in detail, and it will be mailed free upon request.

The Name Apco is well known to the trade and the owner of this trade mark, the Auto Parts Company, Providence, R. I., is calling the attention of jobbers and



Apco Brake Rod Support.

dealers to its brake rod support in a novel manner. Elsewhere in this issue will be noted the advertisement of the company, which offers to send a sample set of the ball bearing brake rod supports for 75 cents, which is considerably less than the usual price.

The device is shown in an accompanying illustration and it is stated by maker that it is the

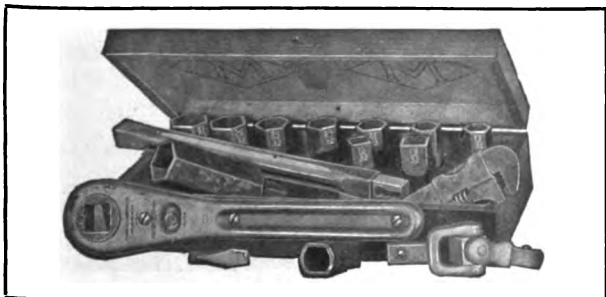
only brake rod support that can be attached without removing members to which it is fitted. Only a screw driver is necessary to tighten clamping bolt. The brake rod is prevented from vibrating by a ball and plunger, the tension being automatically maintained by a spring. The brake rod is slipped into position after removing a cotter pin and plunger. Being ball bearing the brake rod support does not interfere with the movement of the rod, in operation. The Auto Parts Company is issuing a new catalogue containing many new Ford accessories, which will be mailed free upon request.

The Monarch Manufacturing Company, 213 North Main street, Dayton, O., maker of welding and decarbonizing outfits, has evolved an interesting proposition for the trade, one that is a departure from conventional sales methods. By it a repair shop, garage, service station, etc., is enabled to obtain a complete welding and decarbonizing equipment at a very small expenditure. Details of the offer will be submitted by the company upon request.

The advantages of such an outfit are well known to the trade, as it permits of saving considerable time in the welding of parts that would otherwise have to be sent outside. The uses to which a welding equipment may be put are so numerous that a large number of shops have installed them. The Monarch Manufacturing Company's equipment is most complete and the concern is prepared to submit interesting figures showing the profits possible with its outfits.

The Frank Mossberg Company, Attleboro, Mass., is manufacturing a special socket wrench set for the model T Ford car and one of the qualities of the equipment emphasized is that certain components not accessible with the usual wrench set can be reached with it. In designing the set particular attention has been paid to producing sockets which will reach every part, and the result is a very practical outfit.

The set is known as the No. 15 and includes the Mossberg ratchet socket wrench No. 350, a tubular extension bar, universal joint, screw driver bit, spark plug socket and nine regular, mottled, thoroughly hardened pressed steel sockets. The last named members include a special oval socket for the three crankshaft bearing bolts, difficult members to reach with conventional types of tools. The equipment comes in a neat wooden box or a flexible



Mossberg Ford Socket Wrench Set.

fibre case and retails for \$5.70. Trade discounts will be forwarded upon request, also catalogue of the Mossberg lines.

The Headlight Support Company, 1212 Dime Bank building, Detroit, manufacturer of auto devices, is marketing Turning Headlights for model T Ford automobile, and one of the qualities of the design is that they may be quickly and easily attached. As the name implies, the device actuates the headlights so that they automatically follow the slightest movement of the steering wheel, thereby throwing the light where it is needed



Showing Advantage of Headlight Support Company's Turning Headlights.

most. When rounding a curve the rays are so projected that the inner portion, as well as the centre of the road, is illuminated, making for safety.

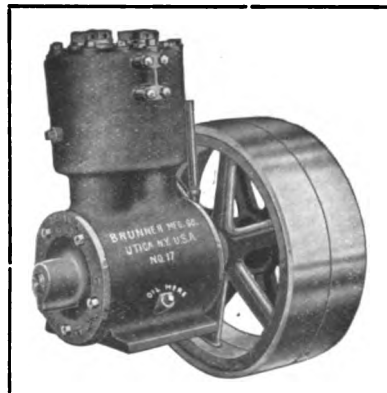
The advantages over the fixed types of lamps are obvious. The Turning Headlights permit of driving with safety over unknown roads, entering curves and turning out for approaching vehicles, as the lamps automatically turn as above explained.

The maker states that the lamps will not rattle or work loose and that they are sold under a liberal guarantee. The retail price is \$10, and the company has territory open, as well as a good proposition for the trade. Full particulars as to sample sets, prices, etc., will be forwarded upon request. The company also markets the Gasolock, which has been described in these columns.

The Brunner Manufacturing Company, Utica, N. Y., is well known among the trade as the maker of high grade compressors for garages, repair shops and service stations. This concern has made a specialty of power driven compressors for years, and each Brunner machine is backed by a guarantee for service, durability and satisfaction. The company calls attention to the statement that some of its compressors have been in use for nine years and are still efficient.

All types and sizes of machines are constructed to meet requirements and an accompanying illustration depicts a garage type, the No. 17

vertical, a compact belt driven unit. The No. 17 is a vertical, two-cylinder compressor, adapted for large garages and service stations where severe service is required. It has a capacity of seven feet of air and 170 pounds pressure at 350 revolutions a minute, and is used in connection with tanks of 80 to 150 gallons capacity. Lubrication is by the splash system.

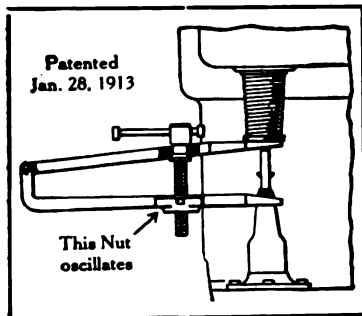


No. 17 Vertical Brunner Compressor.

The No. 102 Brunner is a two-cylinder unit, lubricated by the splash system and has adjustable safety valves in the cylinders. The company states that it will supply more air and higher pressure with less power than any other compressor made, of same capacity. It supplies three feet of air and 150 pounds pressure at 400 revolutions a minute. The Brunner Manufacturing Company produces a variety of compressors, prices and details of which will be forwarded upon request.

A. R. Mosler & Co., New York City, ignition specialist, is manufacturing the Mosler Vesuvius spark plug, which is designed to withstand severe service. It is made with stone insulation, absolutely gas tight, and is sold with a very liberal guarantee. Complete details and prices will be forwarded upon request.

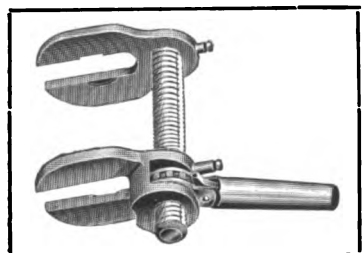
The C. P. Improved Valve Lifter, manufactured by the Clinton Machine Works, 460 High street, Clinton, Mass., is a practical, universal valve lifter and is inexpensive, retailing for \$1. As will be noted by the accompanying illustration, which shows the tool in service, it operates in a manner similar to a vise, a threaded member being actuated by a lever. By placing the forks of the



C. P. Improved Valve Lifter in Position.

lifter on the pushrod and valve spring, the screwing of the threaded member moves the upper fork upward, compressing the spring. The lower fork carries an oscillating nut, compensating for the movement of the upper fork. As is obvious from the illustration, the spring is locked, enabling the workman to use both hands to remove the retaining key or pin, an advantage where these members are

burred and require force. The design also eliminates the possibility of the tool slipping and injuring the hands. It is adapted to any type and make of motor.



Morgan Utility Tool.

The Morgan Manufacturing Company, Newport, R. I., maker of automobile specialties, has brought out a new brass and metal polish termed MorganBrite, which is not only held to impart a lustrous finish, but an enduring one. It comes in the sealed Polisaver cans, in all popular sizes, and the prices are very attractive. The company has an interesting proposition and samples for the trade, which may be obtained by writing department F.

The Morgan utility tool, as the name implies, is designed for a number of useful purposes. It can be utilized as a valve spring lifter, and its construction is such that it can be locked to hold a load in either direction. The tool can also be employed as a clamp, patch holder, spring compressor or stretcher, hand vise, drill jig, etc. It is made of a very tough steel and will withstand severe service. It comes in sheradized or nickel plate finish, retailing for \$2 and \$2.25 respectively. The Morgan Manufacturing Company will forward its catalogue and trade prices upon request.

RECENT PATENTS.

Wrench, James F. Bailey, Jacksonville, Fla., assignor of one-half to Franklin T. Sutherland, same city; No. 1,092,133. Filed April 22, 1913.

Route Indicating Mechanism, Ernest Albert Jones, New York City, No. 1,092,147. Filed July 29, 1913.

Brake Mechanism, Asher J. O'Brien, Seattle, Wash.; No. 1,092,162. Filed Aug. 21, 1912.

Resilient Wheel, John A. Stahle, Boston, Mass., assignor, by mesne assignments, to Stahle Mechanical Tire Company, Ltd.; No. 1,092,183. Filed Jan. 11, 1910; renewed Sept. 5, 1913.

Piston Packing Ring, Roy L. Burd, Chicago, Ill.; No. 1,092,201. Filed May 6, 1913.

Engine, George F. Dillig, Baltimore, Md.; No. 1,092,295. Filed April 9, 1912.

Resilient Wheel, Arthur Sherwood, New Haven, Conn.; No. 1,092,227. Filed Dec. 7, 1911.

Carburetor Attachment, Julius Martin and Harry Sibbald, New York City; No. 1,092,279. Filed Aug. 16, 1913.

Spark Plug, William Sibert Witter, Toledo, Ia.; No. 1,092,322. Filed Jan. 6, 1912.

Vehicle Brake, Arthur C. Culver and Albert W. Russel,

Detroit, Mich.; assignors to Russel Motor Axle Company, same city; No. 1,092,342. Filed Aug. 30, 1913.

Tire, Michael Hallanan, New York City; No. 1,092,353. Filed Aug. 15, 1913.

Electric Ignition Generator, Benjamin Lawrence, Leyton, England; No. 1,092,370. Filed June 3, 1913.

Auxiliary Air Inlet Device, Lewis T. Rhoades, Mont Clare, Penn., assignor to New York Coll Company, New York City; No. 1,092,395. Filed Oct. 7, 1913.

Headlight and Shifting Means, Martin Vaculla, Munhill, Penn.; No. 1,092,412. Filed Dec. 10, 1913.

Apparatus for Preventing the Raising of Dust, Joseph Widerkehr, Colmar, Germany; No. 1,092,416. Filed Sept. 29, 1913.

Ignition Apparatus, Joseph A. Williams, Cleveland, O.; No. 1,092,417. Filed March 5, 1913.

Tire Carrier, David L. Vaughan, Riverton, N. J.; No. 1,092,463. Filed Oct. 4, 1913.

Motor Driven Air Pump, Carl E. L. Lipman, Beloit, Wis., assignor to Lipman Manufacturing Company, same city; No. 1,092,495. Filed May 19, 1913.

Funnel, Willie L. Blanchard, Lehigh, Okla.; No. 1,092,517. Filed June 22, 1913.

Vehicle Brake, Russell Huff, Detroit, Mich., assignor, by mesne assignments, to Packard Motor Car Company, same city; No. 1,092,531. Filed July 16, 1909; renewed Oct. 14, 1912.

Wheel, Charles L. Heisler, Schenectady, N. Y.; No. 1,092,573. Filed May 27, 1912.

Rotary Valve Motor, Russell T. Kingsford, Plainfield, N. J.; No. 1,092,578. Filed Nov. 26, 1912.

Speedometer, Edd C. Oliver, Detroit, Mich.; No. 1,092,590. Filed Aug. 22, 1910.

Locking Device for Electric Lamps, Etc., Albert D. Bartlett, Washington, D. C.; No. 1,092,627. Filed June 8, 1913.

Motor Speed Regulator, Richard G. Shirley, Cleveland, O.; No. 1,092,667. Filed May 22, 1913.

Motor Starter, Harry Hinckley Moseley, Atlantic, Mass.; No. 1,092,739. Filed June 14, 1913.

Steering Gear, Edward S. Robinson, Oroville, Cal., assignor to Golden West Motors Company, Sacramento, Cal.; No. 1,092,745. Filed May 24, 1913.

Resilient Wheel, Noah Thomas Sharp, Ludlow, Ky., assignor of one-half to Andrew Houck, Cincinnati, O.; No. 1,092,755. Filed Aug. 27, 1913.

Piston, Ferdinand G. Haas, St. Paul, Minn.; No. 1,092,834. Filed July 29, 1912.

Piston, Edward O. Spillman and Louis P. Mooers, North Tonawanda, N. Y.; No. 1,092,870. Filed July 18, 1913.

Impulse Pump, William H. Stutz, Toledo, O., assignor, by mesne assignments, to E. L. Ackerman, Detroit, Mich.; No. 1,092,873. Filed May 3, 1913.

Licence Number Plate, Stephen S. Adams, St. Louis, Mo.; No. 1,092,887. Filed Aug. 4, 1913.

Folding Top Holder, Harry DeWitt Cox, Richmond, Va.; No. 1,092,898. Filed March 26, 1913.

Mechanical Gearshift, Dean C. Lewis, Reading, Penn.; No. 1,092,922. Filed May 16, 1913.

Resilient Tire, Augustus Tyler, Wheeling, W. Va.; No. 1,092,963. Filed Nov. 5, 1912.

Tire, Charles H. DeVoll, New York City, assignor, by mesne assignments, to American Spring Tire Company, Dover, Del.; No. 1,092,981. Filed July 31, 1911.

Nut Lock, Otto A. Heckel, St. Louis, Mo.; No. 1,093,050. Filed Feb. 10, 1912.

Rotary Engine, Arthur K. Landsmann and Fritz Dippon, St. Louis, Mo.; No. 1,093,056. Filed Dec. 6, 1910.

Warning Device (Horn), Alpheus C. Lippincott, East Orange, N. J.; No. 1,093,058. Filed March 14, 1913.

Motor Starter, Frank Morgan, Melrose, Mass.; No. 1,093,065. Filed March 29, 1913.

Resilient Wheel, Charles W. Rentz, Diller, Neb.; No. 1,093,077. Filed July 26, 1913.

Resilient Wheel, Robert E. L. Crosby, Jonesboro, Ark.; No. 1,093,115. Filed March 1, 1912.

Lamp, Charles E. Godley, Detroit, Mich., assignor to Edmunds & Jones Manufacturing Company, same city; No. 1,093,122. Filed Sept. 24, 1913.

Spring Wheel, George W. Graves, Mosley McCollman and Alexander P. Gibson, Alderson, W. Va.; No. 1,093,124. Filed March 10, 1913.

Steering Mechanism, Charles Lepley Hays, Eldora, Ia.; No. 1,093,130. Filed Feb. 16, 1912.

Electric Heater, George A. Arnold, Middletown, Conn., assignor to Arnold Electric Company; No. 1,093,237. Filed March 19, 1913.

Bearing, Burton L. Lawton, Meriden, Conn.; No. 1,093,194. Filed Oct. 13, 1913.

ROADS IN MEXICO.

A Statement of Conditions as Prepared by the American Highway Association.

In view of the present military situation in the Republic of Mexico, it will prove of interest to note the condition of the roads in certain sections of the country, as prepared by the American Highway Association. The following statement has been issued by that body:

The Laredo-Salttillo road, regarded by army officers as the best, as well as the shortest military route to Mexico City, will present unexpected difficulties to an invading army. Within a few weeks the season of rain will begin in Mexico, and owing to the failure of the officials of that country to maintain their roads, many of the highways will become impassable.

There are three routes by which an invading army might enter Mexico, the one starting at Laredo, which avoids the long desert; another by way of El Paso, and the third by way of Eagle Pass. The roads in Mexico are in such bad condition that the hauling of artillery over them will be very difficult, especially after the rainy season sets in and the highways become heavy with mud.

With the exception of the valley of Mexico and a few mining regions, there are few improved roads. In most sections they are little better than the unimproved earth road, and very little work is done, either in repair or maintenance, except as is absolutely necessary for immediate traffic.

In the State of Chihuahua, where Carranza and Villa have their political headquarters, a government appropriation, amounting to only \$1500 in gold each year, is made with a view to keeping the roads and bridges in repair. On the haciendas, which in some instances are larger than one of our counties, the necessary roads are crudely maintained by the owners merely for their own convenience.

The laws of Mexico provide that the roads be at least 36 feet wide and that they be repaired each year. Failure to comply with these provisions entails a double fine on the offending parties, the fine being paid, theoretically, in either labor or money. There is no attempt to enforce this law, and the roads are given little attention.

HOW TO SELL CARS.

KisselKar Official Finds Prospective Buyers Thoroughly Understand Automobiles.

As the result of his experience in the sale of KisselKar machines, Ralph Ketchum of the Kissel Motor Car Company, Hartford, Wis., offers what he believes to be good advice to those who are engaged in the sale of automobiles. He says:

Every season adds very noticeably to the number of laymen who thoroughly understand automobiles, but the sort of buyer who cares to discuss technical details is still greatly in the minority, and the salesman should always wait for an invitation before plunging into the intricacies of mechanical construction. There are certain points that every prospective purchaser, novice to expert, is more concerned about and regarding which he must be satisfied before a sale is possible. These include the appearance of the car, its attributes of comfort and convenience, its facility of operation and the accessibility of its working parts.

Inspecting and demonstrating the car having cleared up these qualities, the wise purchaser will ask about the experiences of present owners. If the car looks well,

rides well, drives well and, in addition, has a record and reputation for satisfactory service, Mr. Prospect is generally convinced, and it is useless to burden his mind with technique over which, at best, there is always possible argument.

I try to convince the customer that the KisselKar is a fine appearing car; that it is roadworthy, simple and easily operated; of superior riding quality, and last, but by no means least, of high standing among owners for efficient and economical service. If I fail on any one of these counts I expect to lose the sale.

COMING EVENTS.

May.

- May 14—S. A. E. motor testing division meeting, New York City.
- May 15-16—Track meet, Columbus, O.
- May 20—Roadability run, Beach Haven, Penn.
- May 20-June 7—International automobile and agricultural show, Warsaw, Poland.
- May 25-26—Targa Florio race, Italy.
- May 30—500-mile race, Indianapolis, Ind.
- May 30—Track meet, New York City.
- May 30—Track races, Providence, R. I.

June.

- June 1—Coupe Florio race, Palermo, Italy.
- June 1—Reliability run, Philadelphia, Penn.
- June 6-7—Track meet, St. Louis, Mo.
- June 10-11—Isle of Man road race.
- June 17-18—Hill climb, Uniontown, Penn.
- June 19—Track meet, Boston, Mass.
- June 23-26—S. A. E. midsummer meeting, Cape May, N. J.
- June 24-26—Meeting National Gas Engine Association, Chicago, Ill.
- June 27—Race meet, Brooklands track, Weybridge, England.
- June 30—Track races, Sioux City, Ia.

July.

- July 1-3—Non-stop run, Chicago-Boston, for Glidden trophy.
- July 3-4—Mid-summer meeting, American Automobile Association, Bretton Woods, N. H.
- July 3-4—Road races, Tacoma, Wash.
- July 4—Track races, Providence, R. I.
- July 4—300-mile race, Sioux City, Ia.
- July 4—Grand Prix, Lyons, France.
- July 17-18—Speedway meet, Seattle, Wash.
- July 25-26—Grand Prix, Belgium.

August.

- Aug. 21-22—Road races, Elgin, Ill.
- Aug. 27—Race meet, Brooklands track, Weybridge, England.

September.

- Sept. 5—Track races, Milwaukee, Wis.
- Sept. 7—Track races, Providence, R. I.
- Sept. 9—Speedway races, Pomona, Cal.
- Sept. 9—Road races, Corona, Cal.
- Sept. 9—Grand Prix, Italy.
- Sept. 14—Track meet, Milwaukee, Wis.
- Sept. 26—Race meet, Brooklands track, Weybridge, England.
- Sept. 26-Oct. 6—Show, Berlin, Germany.

October.

- Oct. 1—Kerosene motor competition, Paris, France.
- Oct. 2-3—Track meet, Oklahoma City, Okla.
- Oct. 2-3—Track meet, Trenton, N. J.
- Oct. 9—Speedway races, Chicago, Ill.
- Oct. 16-26—Automobile Salon, Paris.
- Oct. 17-24—Show, Pittsburg, Penn.
- Oct. 19-26—American road congress, Atlanta, Ga.

November.

- Nov. 6-16—Olympia show, London.
- Nov. 8-11—Track meet, Shreveport, La.

Governor Glynn of New York State has signed the bill appropriating \$50,000 for the erection of a state plant at the Elmira reformatory for the manufacture by convict labor of vitrified brick to be used for paving on state roads. The act takes effect upon its passage, and Highway Commissioner Carlisle predicts that the plant will be in operation and some new brick roads built before fall.

NEWS OF THE MANUFACTURER AND DEALER.

The following concerns have been incorporated recently for the manufacture or sale of motor cars, accessories, etc.:

Kennedy & Ahrens Company, New York City; \$14,000; to manufacture trucks and automobiles; J. P. Kennedy and others.

Dobbins Automobile Exchange, Newark, N. J.; \$50,000; to deal in automobiles.

Hainlen Company, Harrisburg, Penn.; \$5000; to deal in automobiles.

Auto Clutch Lock Company, Wilmington, Del.; \$90,000; to manufacture locks for automobiles; J. Reichard and others.

Entz Motor Car Corporation, Baltimore, Md.; \$3,000,000; to manufacture cars using the Entz electric transmission.

Grant Motor Livery Company, Chicago, Ill.; \$2500; to conduct a general automobile business.

East Ohio Auto Sales Company, Youngstown, O.; \$10,000; to conduct an automobile business.

Imperial Auto Company, Bowling Green, Ky.; \$8000; J. B. Lucas, J. W. Massey, J. M. Lovell, G. D. Vance.

D. & M. Auto Supply Company, Utica, N. Y.; \$25,000; to conduct a general automobile tire and supply business; S. Mailman, I. Denovsky.

Aulogo Motor Cap Company, St. Louis, Mo.; \$25,000; to manufacture automobile caps and accessories; J. F. Hilbert, Thomas H. Thatcher.

Trautwein & Repair Company, Brooklyn, N. Y.; \$10,-

Penn Spring Works, Baldwinsville, N. Y.; \$28,500; to manufacture springs for automobiles, etc.

Reliable Auto Tire Company, St. Louis, Mo.; \$3000; to deal in tires and accessories.

Johnson Motor Company, Detroit, Mich.; \$30,000; to deal in motor vehicles and accessories.

Pan-O-Lite Grease & Oil Company, Riverhead, N. Y.; \$30,000; M. E. Arthur, E. Gardner, C. Gardner.

Silent Motor Car & Engineering Company, Los Angeles, Cal.; J. H. Grube, E. T. Houston, S. T. Allen, F. M. Casey.

Cleveland Cyclecar Company, Cleveland, O.; \$200,000; C. Savage, W. H. Noyes, R. Clarke, F. H. Schmidt, W. E. Burns.

Interboro 'Bus Company, Albany, N. Y.; \$25,000; J. A. Voght, E. J. Voght, F. Voght.

C. & S. Rubber Sole Company, Brockton, Mass.; \$50,000; H. F. Crawford, F. E. Shaw, E. L. Shaw.

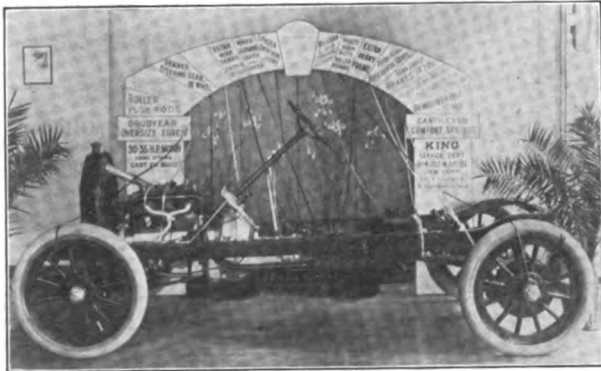
Safety Oil & Supply Company, Brooklyn, N. Y.; \$10,000; J. E. Richardson, G. M. Seckel, W. W. Redfern.

Kahlenberg-Klaus Company, Two Rivers, Wis.; \$25,000; to manufacture internal combustion engines; Louis Kahlenberg and others.

Car-Nation Auto Sales Company, Youngstown, O.; \$10,000; to deal in Car-Nation cars; M. H. Squires, B. O. Schulman, A. Kessler, I. Wikoff, L. J. Schulman.

Tisch Auto Supply Company, Grand Rapids, Mich.; \$20,000; to conduct an automobile accessory house.

WITH THE MANUFACTURERS.



Attractive Window Display Now Being Used by King Sales Agencies in New York City and Boston.

000; Otto Trautwein, Frederick Trautwein, Jr., Walter Trautwein.

United Tire & Rubber Works, New York City; \$10,000; C. Cardum, A. Taraydarian, H. J. O'Connor.

F. W. Walsh Auto Service Company, Newark, N. J.; \$25,000; to conduct a general automobile business; Frederick H. Walsh, H. D. Brangwin, Samuel P. Watson.

H. U. H. Tire Company, Newark, N. J.; \$5000; to deal in automobile tires; Louis Unstaeder, Rosaline Holzman.

International Gasoline & Oil Company, North Tonawanda, N. Y.; \$5000; W. L. Hunt, M. H. Elve, D. H. Bowles.

H. E. Throne Automobile Company, Toledo, O.; \$30,000; to deal in motor cars; H. E. Throne, F. C. Schaal, G. C. Bradley, C. J. Clapp, W. H. Schroeder.

Bryan Automobile Company, Bryan, O.; \$15,000; C. W. Gleason, E. D. Spangler, J. M. Roe, W. T. Gardner, H. W. Gardner.

Wishbone Auto Steel Wheel Company, Butler, Penn.; \$100,000; J. W. Granahan and others.

Flexible Side Car Company, Marion, O.; \$25,000; to manufacture cyclecars, motorcycles, etc.

Model Motor Company, Los Angeles, Cal.; \$1,000,000; to manufacture automobiles.

Halley Garage Company, Halley, Idaho; \$10,000; to conduct a general garage business.

California Auto Tours Company, Los Angeles, Cal.; \$20,000.

Johnson Motor Company, Fort Erie, Ont.; \$1,000,000; to manufacture automobiles.

The King Motor Car Company's New York City and Boston sales offices have been making a decidedly original and attractive display of the King car, utilizing the arch illustrated herewith. The keystone bears the price of the machine and each of the other stones a special feature of the product. The manufacturer plans to furnish each agency of the company with similar displays, providing they have the window space to afford opportunity for their use.

Wilson & Short, Detroit, is to purchase the plant of the Standish Manufacturing Company at Ingersoll, Ont. The company will install machinery and equipment and will manufacture automobile specialties.

The Haynes Automobile Company, Kokomo, Ind., has established a factory branch at 1708 Grand avenue, Kansas City, Mo., which will care for the business of the company in the states of Missouri, Oklahoma, Kansas, Nebraska and Arkansas. J. C. Barcus will be in charge as manager.

The Killen-Straight Manufacturing Company, Appleton, Wis., is to manufacture tractors and commercial cars. The concern has been reorganized, formerly being known as the Killen-Walsh Manufacturing Company, and will greatly enlarge its business and manufacturing facilities. Work has started on additions to its plant. The development and experimental work is said to have been brought to a successful issue.

The L. P. C. Motor Company, Racine, Wis., has leased additional room in the former Racine-Sattley Carriage Works, Racine Junction, a large part of which is already used by the company.

The P. B. M. Manufacturing Company, Los Angeles, Cal., is erecting a new and up-to-date plant for the manufacture of cyclecars and small automobiles. The factory will be electrically operated.

The Wheeler & Schebler Company, Indianapolis, manufacturer of the Schebler carburetors, has joined the group of accessory manufacturers to award additional prizes to the successful drivers at the 500-mile race, May 30. This company will distribute \$1600 among the first four drivers if their cars are equipped with Schebler carburetors. The first prize will be \$1000; second, \$300; third, \$200, and fourth, \$100.

The Whitney Manufacturing Company, Hartford, Conn., has just completed an addition of 27,000 square feet to its plant, which is being equipped with modern machinery.

The Abbott Motor Company, Detroit, is now making parts for the Michigan car, formerly made by the defunct Michigan Buggy Company, Kalamazoo, Mich. A special department has been set aside for this purpose in the new building.

The Harrison Manufacturing Company, Lockport, N. Y., has leased a factory building at Detroit and will produce the Harrison radiators in that city. Gould Allen, who is manager of the Detroit office of the company and representative for the Covert Motor Vehicle Company, which is financed by the same capital, will be manager of the new factory.

The A. R. King Manufacturing Company, Kingston, N. Y., has established offices at 50 Church street, New York City, with William C. Hunter in charge as sales manager. King trucks are produced by the concern.

The Santo Rubber Company, Pittsburg, Penn., has purchased six acres of land at Niagara Falls, N. Y., and awarded a contract to erect a large plant, costing \$60,000. The company will manufacture automobile tires and other rubber goods.

The Standard Motor Truck Company, Detroit, maker of three and five-ton trucks, is now located in its new factory on Bellevue avenue. Albert Fisher, president and treasurer of the company, who owns controlling interest, has purchased adjoining property and will build when additional business warrants it.

The Universal Machinery Company, Milwaukee, Wis., manufacturer of the Mack motor for cyclecars, is now shipping from 25 to 30 motors a day and will almost double this quantity when the additions to the large plant are completed.

The Hayes Ionia Body Company, Ionia, Mich., has started the erection of a large addition to its plant to cost \$20,000. This step was taken in order to produce 150 bodies a day.

The Falcon Cyclecar Company is now well established in its new factory at Staunton, Va., shown in the accompanying illustration. The small building at the left is used as the machine shop and tool room, and the larger structure for the assembling, painting, etc. The plant is located on the main line of the C. & O. railroad, on which the company plans to begin shipping Falcon cyclecars in quantity in the near future.

The Cadillac Motor Car Company, Detroit, is planning to erect a new warehouse and factory that will be eight stories high and of reinforced concrete and brick.

The Rubber Goods Manufacturing Company, New York City, at its annual meeting held recently, elected W. S. Ballou, N. F. Brady, S. P. Holt, F. W. Eddy, J. B. Ford, Ernest Hopkinson, C. A. Hunter, Lester Leland, R. B. Price, H. E. Sawyer and E. S. Williams as directors.

The Chelsea Manufacturing Company, Newark, N. J., will produce the Chelsea light speedster, selling at \$390. The motor, clutch and transmission form a compact unit. The body is the streamline pattern, seating the passengers side by side. Wheelbase is 102 inches.

The Ajax Auto Tractor Company, Portland, Ore., has sold its equipment to the Smith & Watson Iron Works for \$50,000. The machinery is now being moved from the Ajax plant to the Smith & Watson works at Front and Harrison streets, where the company will use it in the manufacture of logging machinery. The Ajax company was organized for the purpose of building gasoline trucks by the late W. J. Corbett.

GARAGE AND DEALER.

The Canif Garage, Caldwell, N. J., has purchased the Cleveland garage on Roseland avenue and will operate it in the future.

Caruth Bros., Williams, Ia., has closed a deal whereby it becomes the owner of two lots on Main street, upon which the concern will erect a garage and repair shop. The firm is agent for Detroit and Jackson cars.

The Fort Bragg Garage & Machine Company, Ukiah, Cal., is contemplating the erection of a first class garage.

The Rockingham Garage is the name of a new firm located at Salem, N. H. Edward Cornwell of Pleasant street is interested.

The Pittsburg Taxicab Company, Pittsburg, Penn., has taken over the taxicab business of the Excelsior

Express & Standard Cab Company. The company announces that in addition to the machines of the Excelsior company it is adding 30 new cars of a type considerably larger than those now in service.

McCready & Sears, Ellendale, N. D., who conducted the Motor Inn on Third street, recently returned to its old location on Second street and has joined forces with H. C. McMaster. Business will be conducted under the name of the Motor Inn.

The Standard Garage, Napoleon, O., has purchased a site for a new building to be erected in the near future. Frank and Henry Harms are the proprietors.

The Alliston Garage, Boston, Mass., located at the corner of Harvard avenue, has been sold to Frederick A. Whitwell and associates.

The Connell-McKone Company, Boston, Mass., has established a large up-to-date service station in the Back Bay section. The company is agent for Overland cars.

H. McElroy, Ennis, Tex., has purchased the Interstate garage from Willis & Horn. He will move his machine shop into the garage and continue the business.

The Citrus Garage, Covina, Cal., has been sold to N. N. Webber of Goldfield, Nev. He will take immediate possession and conduct a first class garage and repair shop.

Cooney Bros., Winsted, Conn., has sold its garage to Elain Slater. The business is located on Main street.

J. E. Sprague, Le Roy, N. Y., contemplates the erection of a first class garage on his Stanley place property, and will operate an automobile repair shop. He



Factory of the Falcon Cyclecar Company, Recently Occupied in Staunton, Va.

was formerly connected with the Watson garage of that city.

The George H. Jewett Company is the new name of the former Jewett Garage Company, Worcester, Mass. The company is located at 172 Shrewsbury street.

The Dyer Electric Service Station, Nashville, Tenn., has opened a service station at 1229 Broadway.

G. C. Stoner, Welcome, Minn., has purchased the Welcome garage, also the livery business. The building will be improved and a full line of supplies will be carried.

Bender & Nelson, Baldwin, Wis., has purchased the Tredway building and is remodelling it into a garage and repair shop. The company is agent for the Ford cars.

The Pittsburg Service Repair Company, Pittsburg, Penn., has taken over the repair department of the Pittsburg Motor Service Corporation. The new plant is one of the largest and best equipped in the state.

The Automobile Club of America, New York City, has secured property on 71st and 72nd streets, East Side, as a site for a new three-story garage to house 350 cars for the use of the members.

The Sieg Iron Company, Davenport, Ia., plans to enter the wholesale accessory trade, and this department will be installed in its quarters at 318 East 5th street. The company is the second accessory and supply wholesale house in the state.

The Auto Truck Storage & Exchange Company, New York City, has leased land on Avenue A, near 22nd street, and will erect a new and modern fireproof garage. It is expected that it will be the largest garage in the state when completed.

WINS IN SOUTH AMERICA.

Hupmobile Finishes 400-Mile Run Six Hours Ahead of 14 Other Contestants.

P. S. Steenstrup, now in Buenos Aires as resident export representative of the Hupp Motor Car Company, Detroit, in South America, reports an interesting reliability run, in which the Hupmobile returned victorious six hours ahead of a field of 15 entries, many of which were high powered French machines. The car was driven by Senor Sanchez, and the run was from Buenos Aires to Mar del Plata, a distance of about 400 miles.

The roads in some places were so heavy that it took hours to go a single mile, and the strain on the vehicles was such as to afford a thorough test of their durability. At one point the contestants had the choice of making a long detour to cross the San Porondon river on a bridge, or of being towed across. The Hupmobile accepted neither alternative, Senor Sanchez wrapping the carburetor and magneto in oiled paper and driving across the stream under the machine's own power. In this manner he gained about one hour over his competitors.

THE RUBBER SITUATION.

Development of Plantations Has Had a Decidedly Important Effect on Prices.

The development of plantation rubber, which in the past few years has not only brought down crude rubber prices, but changed the world's basic supply, has had a marked effect on the tire making industry, according to an official of the Goodyear Tire & Rubber Company, Akron, O. He says:

Four or five years ago Brazil produced most of the world's high grade crude rubber supply, and the price was steadily rising. It reached \$3 a pound in 1910, and the supply was not nearly up to the demand, so that a serious crisis was in sight, and there was danger that the prices of rubber products, such as tires, would become prohibitive and seriously retard the development of the automobile.

Meantime, far-sighted men and companies had established vast plantations of young growing rubber trees, easily accessible, instead of being located in remote jungles, and susceptible to the best scientific training. At first the product of these plantations was very small, but it has grown year after year until it is now greater than the wild rubber supply, and has not, even now, reached its full development. Crude rubber has recently been as low as 60 cents a pound. There has been a little rise, but indications are that the trend will be gradually downward for some time, until a rock bottom price, on a basis of the full development of the plantation system, has been reached.

Brazil, which in the beginning did not take seriously the menace of the plantations, failed to protect herself,

either with extensive plantations of her own or by improving facilities for gathering her wild product and preparing it for market, so that now the big basis of the crude supply is in other parts of the tropical world, such as Ceylon, the Philippines, etc.

As a result of all these things, the Goodyear Tire & Rubber Company, which reduced its tire prices gradually, as crude rubber came down, is now supplying the trade a much better tire, at a much lower price, than a few years ago. This policy is vindicated by the fact that Goodyear sales in 1913 amounted to \$33,000,000, at a profit of 6.5 per cent. on that volume.

OFFERS FACTORY FACILITIES.

National Motor Vehicle Company Places Plant at Disposal of Racing Men.

Following the plan which was adopted by the National Motor Vehicle Company, Indianapolis, Ind., last year, George M. Dickson, general manager of that concern, has placed the factory machinery, facilities and employees at the disposal of the contenders in the forthcoming international sweepstakes 500-mile race on the Indianapolis motor speedway, Memorial Day. In 1913 eight different contestants worked in the National factory, replacing broken parts and adjusting their chassis as the result of practise work on the speedway previous to the race. In making the offer again this year, Mr. Dickson says:

While these drivers and their cars are here to win the 500-mile race and to break the record still held by the National car, we feel it our duty to do anything we can to assist them; to make the race as good as possible, and to give the world the right idea about the Indianapolis people. It has been our pleasure even to help competitors in races where we had National cars entered. We hope nothing will happen to cause anyone to need help, but if they do we extend our facilities gladly.

NEW BOOKS RECEIVED.

Good Roads Year Book—An annual compilation published by the American Highway Association, Colorado building, Washington, D. C., and edited by J. E. Pennybacker. Contains a history of road making, digest of state road legislation, motoring laws, full description of differing types of road construction, highway bridge and culvert construction, list of highway officials, summary of state and local road expenditures, lists of highway associations, etc. The book comprises an authoritative compilation on highway matters and will be retained as a work of reference. Price, \$1.

Everything Electrical for the Automobile, Motor Boat and Motorcycle—A catalogue of the complete line of standard automobile and ignition supplies produced by the Western Electric Company, with headquarters at 463 West street, New York City, and branches in a number of cities. The booklet contains more than 50 pages and is fully illustrated.

Moline-Knight—An interesting illustrated catalogue of the Moline-Knight car, made by the Moline Automobile Company, East Moline, Ill. The typographical work is fully in keeping with the character of the product described, and the text matter is compiled with a view to presenting the subject in a manner calculated to instruct the novice as well as the expert. All the components of the car are thoroughly illustrated and particular attention has been paid to the construction of the Knight sliding sleeve motor, with which this car is equipped.

Tarvia

*Preserves Roads
Prevents Dust—*



*East Front
Street,
Newbern, N. C.*

*The circle shows
the street during
the flood. The
larger photograph
shows it **after**
the flood—the
Tarvia pavement
uninjured.*

Even floods do not affect a Tarvia roadway—

Here is a road that was built in 1911 with a five-inch concrete base and a two-inch macadam surface bonded with Tarvia.

In September, 1913, it was flooded by river and tide in a great storm, as shown in the small picture. When the waters subsided, the tarviated road was unharmed and no repairs were required! The larger photograph was taken *after* the flood.

The City Engineer, Raymond R. Eagle, writes:

"While this was a very severe test on the pavement it stood up perfectly under it and the pavement remained in as good condition as before the storm." He also says: "The Tarvia has given entire satisfaction."

Tarvia is a coal tar product of great bonding power.

It encloses the stone in a tough matrix from which neither water nor traffic can tear it loose.

It vastly increases the durability of the road and usually cuts down the repair bill enough to offset the entire cost of the treatment.

Tarvia is made in three grades: "Tarvia X" is suitable for building Tarvia-macadam roads; "Tarvia A" and "Tarvia B" are thinner grades suitable for roads already in use, to preserve them and make them dustless.

Booklet regarding the Tarvia treatment free on request.

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New York Chicago Philadelphia Boston St. Louis Kansas City Cleveland
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THE PATERSON MFG. CO., Ltd.: Montreal Toronto Winnipeg Vancouver St. John, N. B. Halifax, N. S. Sydney, N. S.





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When you specify Bosch you get an ignition system backed by a reputable concern, having a remarkably efficient system rendering real service.

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and be served and satisfied
Bosch Magneto Company
204 West 46th Street, New York, N. Y.

*199 Service Stations in
U. S. and Canada that
really serve.*



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PREST-O-LITE IS THE MOST ECONOMICAL LIGHTING SYSTEM

All the Facts on all Lighting Systems mailed you on request.
THE PREST-O-LITE CO., Inc., 226 Speedway, Indianapolis, Ind.
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For Perfect Control and Safe, Comfortable Driving use

Weed Anti-Skid Chains

At all Reputable Dealers
Weed Chain Tire Grip Co., New York

Don't let the carbon accumulate in your cylinders until they require the drastic DOLLAR-A-CYLINDER treatment.

Clean them every two or three weeks with CARBONOX. Costs less than 5 cents a cylinder. Keeps them as bright inside as a new dollar.



A dollar's worth will remove the carbon from one cylinder twenty times. The cost is so low, the job is so easy, there's no temptation to put it off. It beats the strenuous, expensive way, even as a bath beats powder and perfume or as fresh air, exercise and prunes beat strong physics.

You inject Carbonox, a liquid, at the spark plug openings, or thru the priming cups, turn the engine over a few times and then let set for twenty minutes. When you start it, the carbon will be blown out thru the exhaust. *A sheet of paper placed under the exhaust opening will show the amount of carbon removed.*

CARBONOX does not dissolve the carbon, but attacks and destroys the charred oil which holds the flakes of carbon together and to the metal. It's simple, efficient, "Chemically Correct". Positively non-injurious to metal.

Made by the makers of SE-MENT-OL, the self-acting radiator cement. (Finds-the-leak-and-fixes-it)

THE NORTHWESTERN CHEMICAL CO.
MARIETTA, OHIO.

EVERYTHING FOR THE AUTOMOBILE

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Manufacturers and Jobbers

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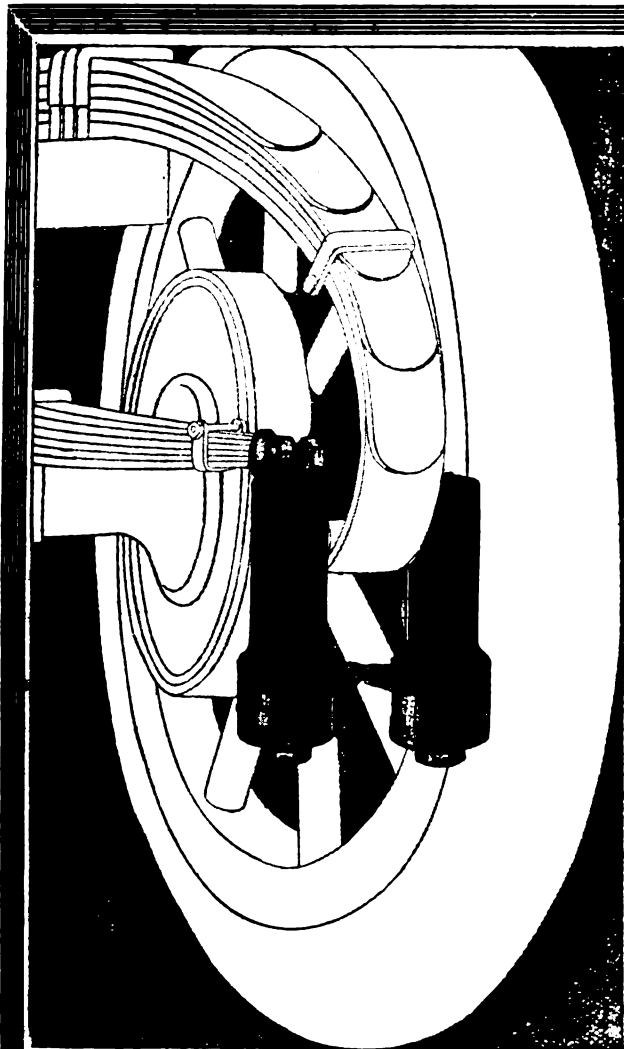
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No matter how hard you inflate your tires, our absorbers insure perfect resiliency and save half your present tire expense. Unnecessary wear and tear on motor, transmission and other components is eliminated because they reduce vibration to a minimum.

The combined efficiency and durability of J. H. S. SHOCK ABSORBERS make them worth all they cost and more—they're the only kind leading mechanical engineers have considered fit to endorse.

For thirty days you can try them at our expense. J. H. S. are made for every known car.

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FULL REAR SET \$25.00

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MAKE IGNITION CERTAIN!

Develop More Power on Less Fuel

A type for every engine.

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LOWELL, MASS.**

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"4" Touring Car \$1050

"6" Touring Car \$1575

"6" Landau-Roadster \$1800

"6" Sedan \$2250

BUY IT BECAUSE IT'S A STUDEBAKER
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PREMIER
AMERICA'S
GREATEST TOURING CAR



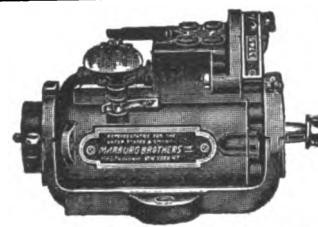
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Its efficiency is proved by scientific facts—not mere claims. Write for Ovington Data D. to **The J. M. Shock Absorber Co.**, 210 S. 17th Street, Philadelphia.
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Bi-Motor Equipment Co., 180-182 Massachusetts Ave., Boston.
Danver Accessory Co., 18 Broadway, Pawtucket, R. I. (Daco.)
Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.
Miller, Chas. E., 97-103 Reade St., New York.
Branches: 202-204 Columbus Ave., Boston; Bridge and Dwight streets, Springfield, Mass.; 274 Trumbull St., Hartford, Conn.; 924 Eighth Ave. and 2782 Broadway, New York; 1421 Bedford Ave., Brooklyn, N. Y.; 318 No. Broad St., Philadelphia; 824 Main St., Buffalo, N. Y.; 1829 Euclid Ave., Cleveland; 227 Jefferson St., Detroit; 259 Peachtree St., Atlanta, Ga.; 601-603 Baronne St., New Orleans, La.; 135 Central Ave., Albany, N. Y.; 274 Halsey St., Newark, N. J.
Milwaukee Auto Specialty Co., 128 Second St., Milwaukee, Wis.
Motor Parts Co., 185-187 Columbus Ave., Boston; 818 No. Broad St., Philadelphia; Springfield, Mass.
Northwestern Chemical Co., Marietta, O.
Walte Auto Supply Co., 81 Exchange place, Providence.

ACETYLENE TANKS. (See Tanks.)

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Williams Foundry & Machine Co., Akron, O.

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AUTOMOBILES. (See Cars.)

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Ahlberg Bearing Co., 2624 Michigan Ave., Chicago; 1786 Broadway, New York City; 805 Woodward ave., Detroit
Boyd, F. Shirley, 903 Boylston St., Boston. (R. I. V.)
Hyatt Roller Bearing Co., Detroit.
Marburg Bros., Inc., 1790 Broadway, New York. (S. R. O.)
New Departure Mfg. Co., Bristol, Conn.
R. I. V. Co., 1771 Broadway, New York. (R. I. V.)

BATTERIES.


Edison Storage Battery Co., 137 Lakeside Ave., Orange, N. J. (Edison.)
Electric Storage Battery Co., Philadelphia. (Exide.)
Gelsler Bros. Storage Battery Co., 514 W. 57th St., New York.
Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City. (J-M.)
Walte Auto Supply Co., 81 Exchange place, Providence (Success.)

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Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

(Continued on Page 88.)

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FOR YOUR AUTO

NON-FLUID OIL

LOOK FOR THE SPROCKET WHEEL
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Signs like these, painted in 6 colors on boards 50 feet long and 10 feet high, have been erected in the principal cities of Massachusetts, Connecticut, and Rhode Island.

Look for them as you tour New England. Following their suggestions and using NON-FLUID OIL will insure you perfect lubrication—increase the service and smooth-running qualities of your cars—and economize your oil bills.

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Be sure to ask for the orange-colored can bearing the NON-FLUID OIL trade mark.

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DEALERS: These signs will increase the demand for Non-Fluid Oil. Prepare for your share of this increased trade.




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HOYT METERS

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INSTRUMENT

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Simple—durable—small—light—and can be attached to any make of car. Highest efficiency—can be operated at any speed without injury to working parts. Will deliver at 800 revolutions a minute a steady flow of fresh air equal to the pressure from an air tank charged at 115 pounds to the square inch. Size 6" long, 4" high, 4" wide.

THE TRI-PHOON GARAGE PUMP

Delivered ready for instant use. Small and compact—takes but little room in garage. Either direct or alternating current motors furnished. Mounted on neat truck with handle. All are guaranteed.

PRICES FOR CAR AND GARAGE TRI-PHOON PUMPS.

- 3-Cylinder Air Pump, complete with hose and gauge\$20
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4 cylinders

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No Will Too Steep
No Bend Too Deep
SULTANIC - \$2500
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STOCK CHAMPION
FOUR AND SIX CYLINDER CARS
Electric Starter Electric Lights
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VALVOLINE OIL CO.
Heavy, Medium and Light
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Bay State Autokit, No. 1, \$10
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The Boston Tail Light Detector
Does what its name indicates--tells you when your rear light fails to work and saves court fines.
Easy to Attach. Price \$5.00, in all finishes.
Agents wanted everywhere.

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The "finer points" of EUROPEAN DESIGN
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Interesting literature sent on request

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Branches: F. Shirley Boyd, 903 Boylston St., Boston; C. D. Schmidt, 276 Canal St., New York City; N. A. Petry Co., 1427 Vine St., Philadelphia; F. E. Sparks, 1430 Michigan Blvd., Chicago; Fred Ward & Son, San Francisco.

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Williams Foundry & Machine Co., Akron, O.

BUMPERS AND FENDERS.

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.

Sager Co., J. H., 271 South Ave., Rochester, N. Y. (Diamond.)

CARBON REMOVERS. (See Cylinder Cleaning Compound.)

CARBURETORS.

Findelsen & Kropf Mfg. Co., 2127 Rockwell St., Chicago. (Rayfield.)

Branches: 1140 Michigan Ave., Chicago; 1211 Woodward Ave., Detroit; 1902 Broadway, New York City.

CARS—ELECTRIC PLEASURE.

Baker Motor Vehicle Co., Cleveland. (Baker.)

CARS—GASOLINE PLEASURE.

American Volturette Co., Detroit. (Keeton.)

Cartercar Co., Pontiac, Mich. (Cartercar.)

Cole Motor Car Co., Indianapolis, Ind. (Cole.)

Empire Automobile Co., Indianapolis, Ind. (Empire, Little Aristocrat.)

Haynes Automobile Co., 166 Main St., Kokomo, Ind. (Haynes.)

Jackson Automobile Co., 1400 Main St., Jackson, Mich. (Jackson.)

Knox Automobile Co., Springfield, Mass. (Knox.)

Lexington-Howard Co., Connersville, Ind. (Lexington and Howard.)

Maxwell Motor Co., Inc., Detroit. (Maxwell.)

Metz Company, Waltham, Mass. (Metz.)

Moline Automobile Co., E. Moline, Ill. (Moline.)

National Motor Vehicle Co., 1033 22nd St., Indianapolis. (National.)

(Continued on Next Page.)

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(BUYERS' GUIDE—Continued.)

Nordyke & Marmon Co., Indianapolis. (Marmon.)
 Paige-Detroit Motor Car Co., Detroit. (Paige.)
 Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)
 Premier Motor Mfg. Co., Indianapolis, Ind. (Premier.)
 Reo Motor Car Co., Lansing, Mich. (Reo.)
 Studebaker Corp., Detroit. (Studebaker.)
 Stutz Motor Car Co., Indianapolis. (Stutz.)
 Velle Motor Vehicle Co., Moline, Ill. (Velle.)
 Willys-Overland Co., Toledo, O. (Overland.)

CARS—GASOLINE COMMERCIAL.

Adams Bros. Co., Findlay, O. (Adams.)
 Alma Motor Truck Co., Detroit. (Republic.)
 Factory: Alma, Mich.
 Bessemer Motor Truck Co., Grove City, Penn. (Bessemer.)
 Blair Mfg. Co., Newark, O. (Blair.)
 Cartercar Co., Pontiac, Mich. (Cartercar.)
 Dart Manufacturing Co., Waterloo, Ia. (Dart.)
 Driggs-Seabury Ordnance Corp., Sharon, Penn. (Vulcan.)
 Federal Motor Truck Co., Junction and Leavitt Sts., Detroit. (Federal.)
 Garford Co., Elyria, O. (Garford.)
 General Motors Truck Co., 26 Cadillac Ave., Pontiac, Mich. (GMC.)
 Branches: New York, Chicago, Boston, Philadelphia, Kansas City.
 Gramm-Bernstein Co., Lima, O. (B. A. Gramm's.)
 Knox Automobile Co., Springfield, Mass. (Knox and Martin Tractor.)
 MotorKart Co., 1790 Broadway, New York City. (MotorKart.)
 Factories: Peekskill and Tarrytown, N. Y.
 Palmer-Moore Co., Syracuse, N. Y. (Palmer-Moore.)
 Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)
 Reo Motor Car Co., Lansing, Mich. (Reo.)
 Studebaker Corp., Detroit. (Studebaker.)
 Velle Motor Vehicle Co., Moline, Ill. (Velle.)
 Willys-Overland Co., Toledo, O. (Overland.)

CARS—ELECTRIC COMMERCIAL.

Baker Motor Vehicle Co., Cleveland. (Baker.)
 Couple-Gear Freight-Wheel Co., 575 Buchanan St., Grand Rapids, Mich. (Couple-Gear.)
 Branches: 30th floor, Singer Bldg., New York; 178 Devonshire St., Boston.
 General Motors Truck Co., 26 Cadillac Ave., Pontiac, Mich. (GMC.)
 Branches: See Cars—Gasoline Commercial.
 General Vehicle Co., Long Island City, N. Y. (G. V.)

CARS—FIRE, POLICE AND MUNICIPAL SERVICE.

Cartercar Co., Pontiac, Mich. (Cartercar.)
 Couple-Gear Freight-Wheel Co., 575 Buchanan St., Grand Rapids, Mich. (Couple-Gear.)
 Branches: See Cars—Electric Commercial.
 Knox Automobile Co., Springfield, Mass. (Knox and Martin Tractor.)
 Willys-Overland Co., Toledo, O. (Overland.)

(Continued on Next Page.)

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DOVER ELECTRIC LIGHT BULB CASE

(Pat. Applied For)



It Will Carry Extra Bulbs Safer Than the Ones in the Lamps of the Car.

Send for New 1914 Catalogue

DOVER
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\$2400

Completely Equipped

More Power
More Flexibility
More Economy
More Silence



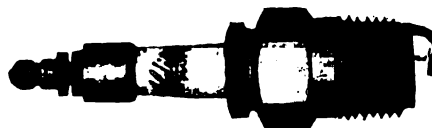
Four-cylinder,
five-passenger,
50 horsepower,
128-in. wheelbase.

Bosch ignition,
Wagner electric
starting and light-
ing, \$2400.

The car of the future will not have poppet valves

Moline Automobile Co., East Moline, Ill.

ALDING PORCELAIN PLUGS



Regular
75c Value

50c
EACH

Write for a gallon of the famous
"ALDING" Oil, in "DUCK" Can, 75c Delivered
ALSTEN & GOULDING COMPANY
36 Foster Street, Worcester, Mass.

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Salvador Motor Co., Farragut Bldg., Massachusetts Ave. Boston. (Salvador.)

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Bowling Green Sales Co., 80 Flatbush Ave., Brooklyn, N. Y. (Ball Carbon Remover.)

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.

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Northwestern Chemical Co., Marietta, O. (Carbonox.)

Prest-O-Lite Company, 226 Speedway, Indianapolis. (Prest-O-Carbon Remover.)

Branches: Atlanta, Baltimore, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Indianapolis, Jacksonville, Kansas City, Los Angeles, Milwaukee, Minneapolis, New York, Omaha, Philadelphia, Pittsburgh, Providence, San Francisco, Seattle, St. Louis and St. Paul.

ELECTRIC LIGHTING EQUIPMENT.

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Pyrene Co. of New England, 176 Federal St., Boston.

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Russell Mfg. Co., Middletown, Conn.

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Dover Stamping & Manufacturing Co., Cambridge, Mass. (Dover.)

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Shawver Co., Springfield, O.

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GUNS, GREASE. (See Pumps, Oil and Grease.)

(Continued on Next Page.)

(BUYERS' GUIDE—Continued.)

HEADLIGHTS, TURNING.

Headlight Support Co., 1217 Dime Bank Bldg., Detroit.

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Garford Mfg. Co., Elyria, O. (Tuto.)

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(Havoline.)Miller, Chas. E., 97-103 Reade St., New York. (Pan-
American.)

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New York. (MoToRol, Non-Fluid, Kejex.)

Northwestern Chemical Co., Marietta, O. (Gear-Silence.)

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Bldg., Chicago; Ford Bldg., Detroit; Indiana Pythian
Bldg., Indianapolis.

Valvoline Oil Co., 27 State St., Boston. (Valvoline.)

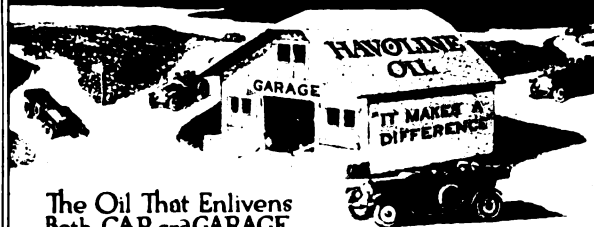
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Owners' Auto List Co., Albany, N. Y.

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Automatic Appliance Co., 172 Columbus Ave., Boston. (Boston.)

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.

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Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

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Northwestern Chemical Co., Marietta, O. (Never-Rust.)

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McQuay-Norris Mfg. Co., Dept. D, St. Louis, Mo. (Leak-Proof.)

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International Metal Polish Co., Quill St. and Belt R. R., Indianapolis, Ind. (Blue Ribbon.)

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PRIMERS.

Duelec Vaporizing Primer Co., 14 North Broadway, Yonkers, N. Y. (Duelec Vaporizing.)

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Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.
 Green & Swett Co., 737 Boylston St., Boston. (Tri-Phoon Car and Garage.)
 Shawver Co., Springfield, O.

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Martell Motor Co., 1928 Columbus Ave., Boston. (Martell Aligning.)

RIMS—REMOVABLE AND DETACHABLE.

Boyd, F. Shirley, 903 Boylston St., Boston. (Dorian.)
 Chester Demountable Rim Co., Fall River, Mass. (Chester Demountable.)
 United States Tire Co., Broadway and 58th St., New York. (Continental and Whittlesey Demountable.)
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RINGS. (See Piston Rings.)

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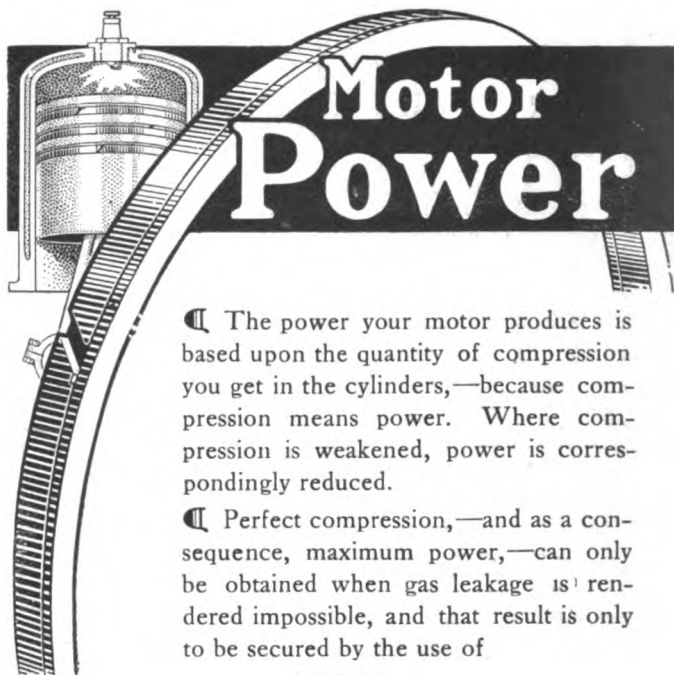
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☞ Perfect compression,—and as a consequence, maximum power,—can only be obtained when gas leakage is rendered impossible, and that result is only to be secured by the use of

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New York City.

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Silvex Company, The, 60 Wall St., New York City. (Bethlehem Five Point.)

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Harding Specialties Co., Inc., 755 Boylston St., Boston.
(Boston.)

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Combination Tail Light Co., 954 Tremont St., Boston.
(Universal Electric.)

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(Prest-O-Lite.)
Branches: See Cylinder Cleaning Compound.

TANKS, TIRE INFLATING.

Prest-O-Lite Company, 226 Speedway, Indianapolis.
(Baby Tire Filler, The Emancipator.)
Branches: See Cylinder Cleaning Compound.

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New York City.

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Shawver Co., Springfield, O. (Tools.)

TIRE CHAIN GRIPS. (See Chains.)

TIRE PRESERVATIVES AND PROTECTORS.

Northwestern Chemical Co., Marietta, O. (Tire-Lac.)

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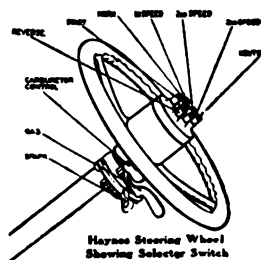
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Do you want to join with a million others, in the pushing through of an unselfish work which means more business, more pleasure and more advantages to all?

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Do you wish to aid in the completion of the most practical enterprise ever undertaken by the American people? A 3400-mile link connecting the two oceans, to be used by, and directly profiting sixty millions of our population?

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Polack Tyre and Rubber Co., 246 W. 59th St., New York City. (Polack.)

United States Tire Co., Broadway and 58th St., New York. Branches: See Rims—Removable and Detachable.

TOPS AND ATTACHMENTS.

Springfield Metal Body Co., 20 Medford Ave., Springfield, Mass.

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Connecticut Steel & Wire Co., Hartford, Conn.

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VIBRATORS. (See Master Vibrators.)

VOLTMETERS—(See Ammeters.)

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National Motor Car Supply Co., 5604 Euclid Ave., Cleveland. (National Garage Steam and Wizard Automatic.)
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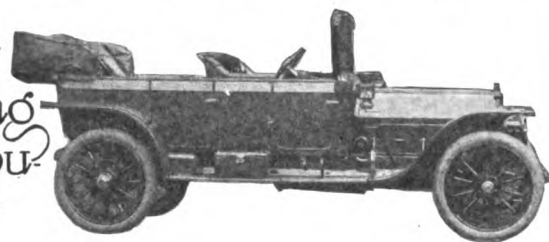
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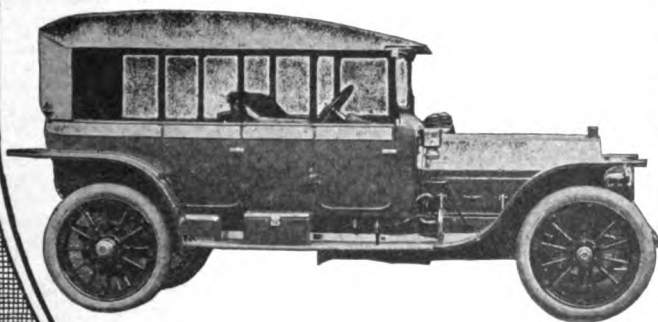
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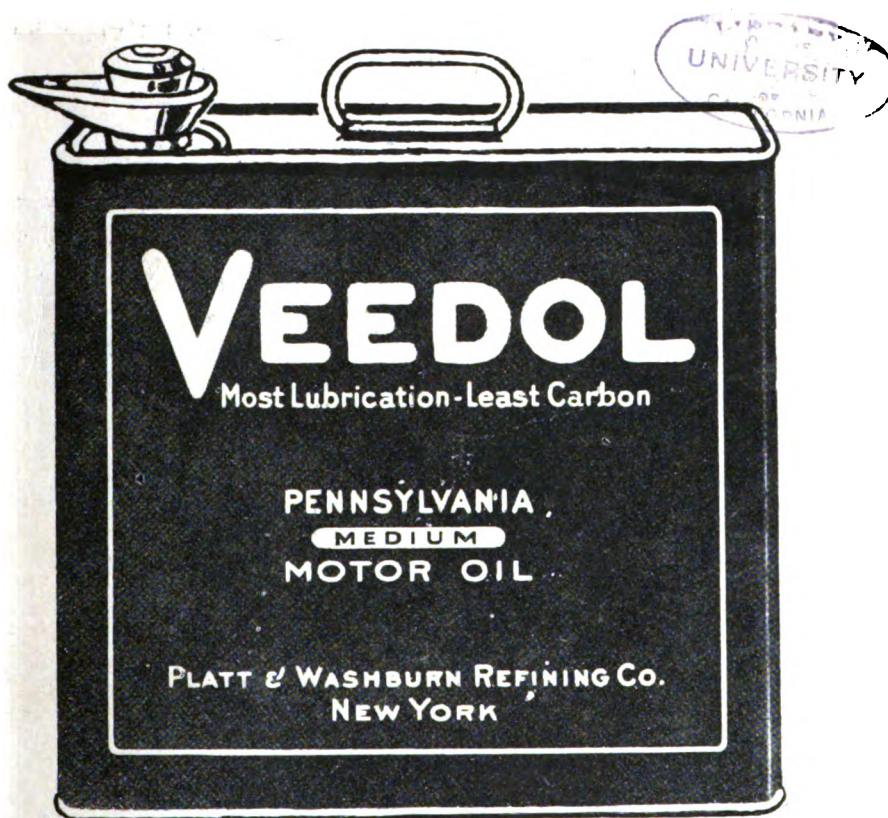
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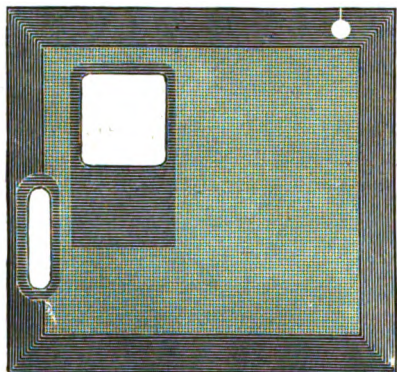
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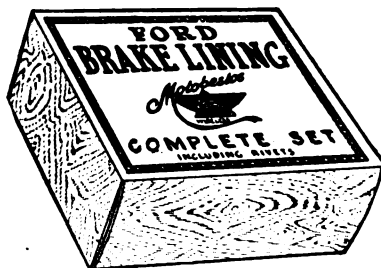


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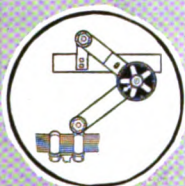
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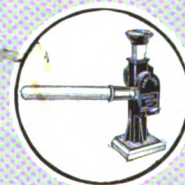
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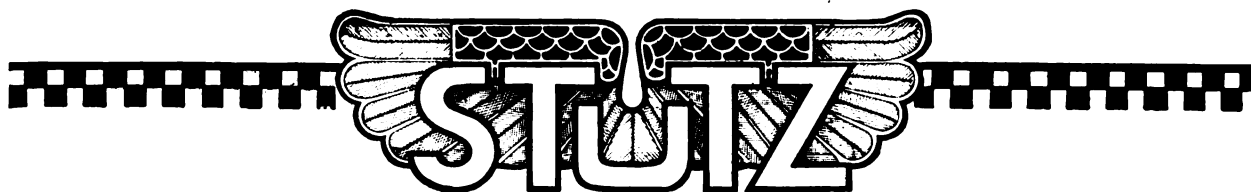
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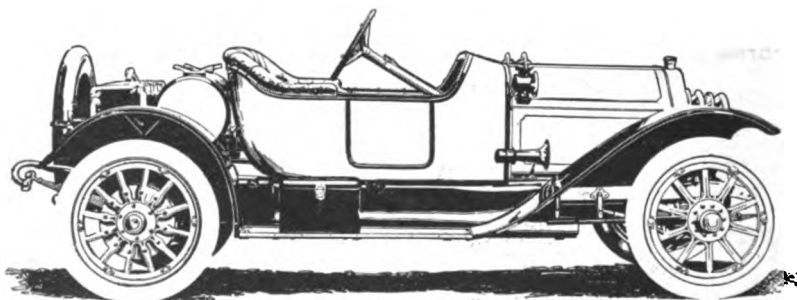
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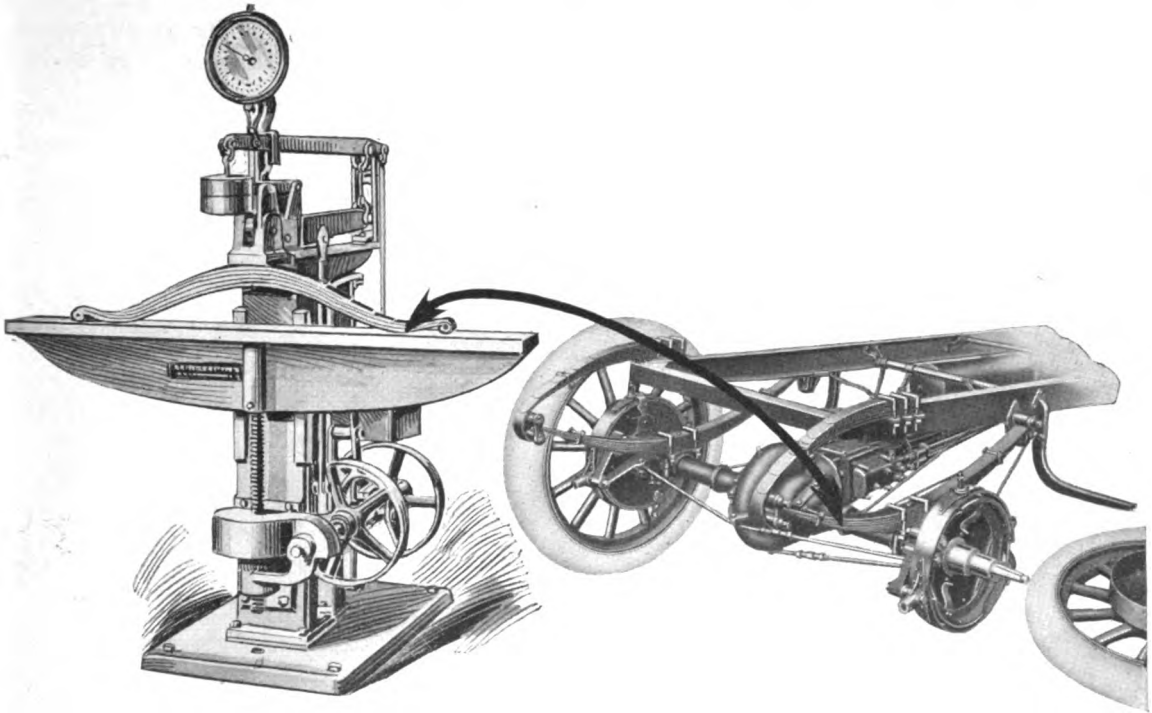
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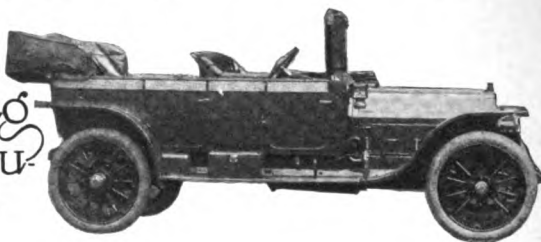
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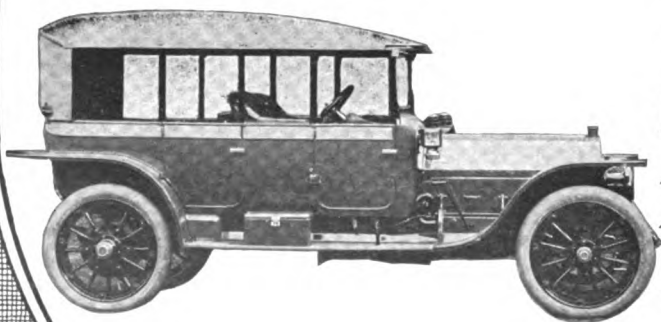
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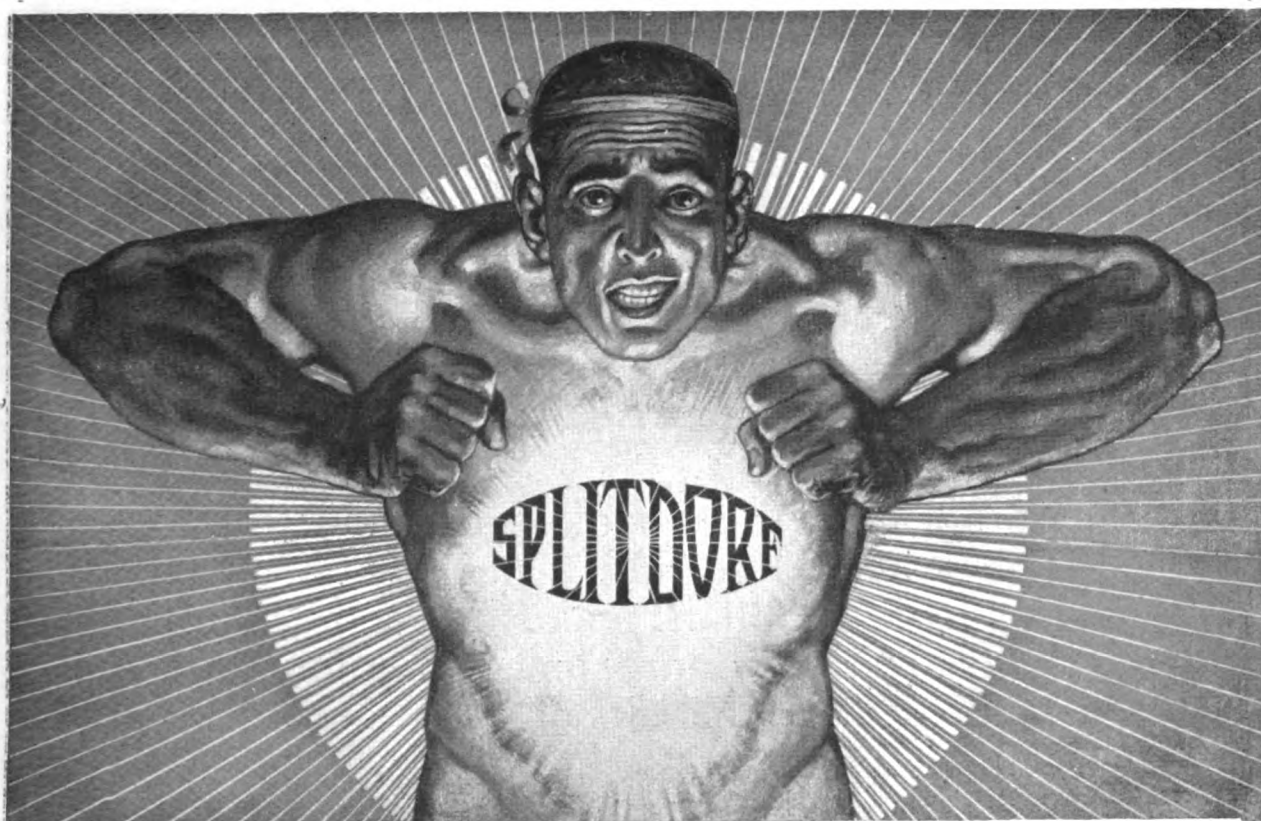
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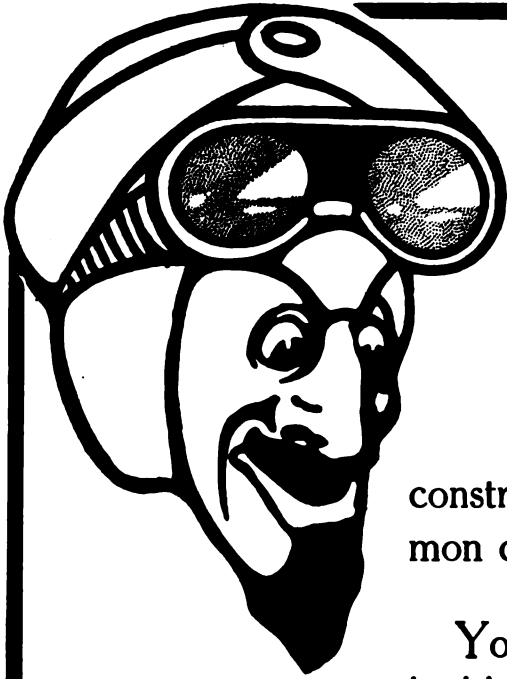
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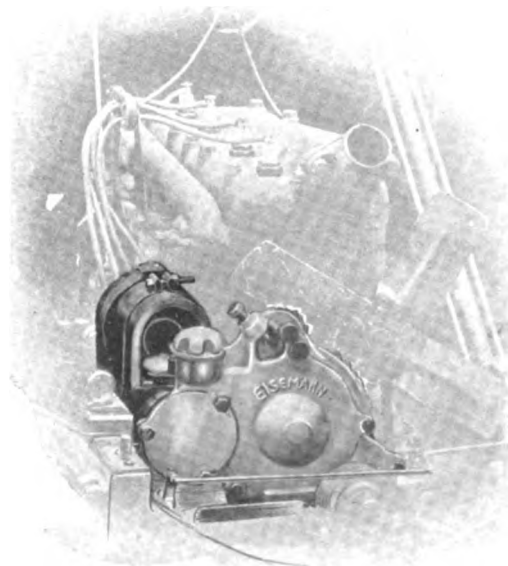
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Times Building **Pawtucket, R. I.**

PUBLISHER'S AND READER'S PAGE.

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Readers Are Invited to make liberal use of the opportunities afforded to cause the special departments, New Accessories (page 35), Correspondence with the Reader (page 43), and Suggestions for New Car Owners (page 66), to be of particular personal interest and benefit. The Buyers' Guide, on pages 86-96, inclusive, is also of value to those who are in need of anything new in cars, accessories, supplies

or fittings. The concerns listed are thoroughly reliable and worthy of your confidence. It may be added that special attention will be given your communication, if you mention The Automobile Journal when writing to advertisers.

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dangerously skidding
on the slippery
pavement ahead——**

You have neglected to put on Weed Chains.

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THE AUTOMOBILE JOURNAL

VOL. XXXVII, No. 8

MAY 25, 1914

Price, \$1.00 the Year

FOURTH INTERNATIONAL SWEEPSTAKES.

Six Nations Represented Among the 44 Cars Entered for the Annual 500-Mile Race on the Indianapolis Speedway, Memorial Day---Winner May Take \$45,575 in Cash and Trophies---Results in the Three Previous Contests.

WITH a purse totalling \$85,125, this sum including the valuation of trophies, and the possibility that the winner may secure \$26,825 in cash, besides the trophies, there

is small wonder that the entry list for the fourth annual international sweepstakes race for 500 miles on the Indianapolis speedway, Memorial Day, includes 44 names. But there are other reasons for this big array of cars and drivers, the number of which must be reduced to 30 by elimination trials, previous to the actual starting of the race at 10 next Saturday morning.

Three international sweepstakes, 500-mile races, have been held on this course—the first in

1911, when Ray Harroun returned a winner with a Marmon; the second in 1912, when Joseph Dawson secured a record with a National, which still stands, and the third in 1913, when Jules

Goux won in a Peugeot, taking the trophies to France. The international character of the event has never been so marked, however, as it promises to be this year.

In the first race, three nations were represented—Germany by two Benz cars and a Mercedes, Italy by two Fiats, and

America by 35 machines, the total number of starters being 40. Twelve machines finished and 13 more were running when the race was called. America won first and second place; Italy, third;



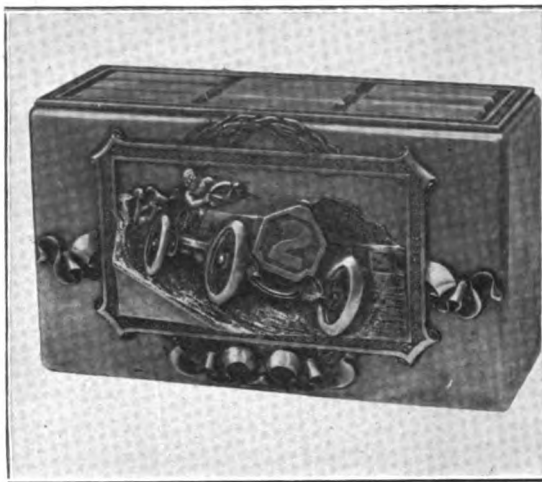
Jules Goux, Winner of the Third 500-Mile Race of 1913, at the Wheel of the National Car Which Created a World's Record in the 1912 Event.

Germany, fourth, and America the remainder of the 10 prizes. The international aspect was not strong, since Mercedes, Benz and Fiat cars had been competing in American events for some years.

In the second event only 27 cars were entered, 24 started, and but nine finished, although one other was running when the race was called. Of the 12 prizes hung up by the speedway management that year, only 10 were awarded. Germany

was represented by one Mercedes and Italy by one Fiat. The rest were all American made. America finished first; Germany, second, and America took the other eight prizes.

Last year 35 cars were entered, and 27 started.



Prest-O-Lite Trophy, Which Goes to Car Leading at 300 Miles.

Five nations were represented—Germany with a Mercedes and a Mercedes-Knight, Italy with three Isottas, England with a Sunbeam, France with two Peugeotots and America with the others. France finished in first place; America, second and third; England, fourth; Germany, fifth; America, sixth; Germany, seventh, and American cars won the other prizes.

The international spirit was strong last year, and is even stronger this. Six countries are represented, as indicated by the accompanying list of entries. A future evidence of the importance in which the contest is held abroad is noted in the fact that foreign drivers are licensed this year by the Automobile Club de

France, so that any records established will be accepted both in this country and Europe.

Ray Harroun won the first race with his Marmon in 6:42:08, averaging 74.65 miles an hour, and he secured a total of \$14,250 in prize money. Joseph Dawson drove the National the 500 miles in 6:21:06 in 1912, averaging 78.73, a world's record for the distance, which still stands. His share of the prize money totalled \$35,000, including the value of the trophies he won. Last year, Jules Goux's time in the Peugeot was 6:35:05. His average was 75.92 miles an hour—better than Harroun's time, but still some little lower than the record created by Dawson's National. Goux's share of the prize money was practically the same as Dawson's the previous year. This year, if the winner secures all the trophies offered, the value of his day's work may reach \$45,474—equivalent to the

ENTRIES IN THE FOURTH 500-MILE RACE.

No.	Car	Driver	Country	Cyl.	Bore	Stroke	Displ.
1....	Burman	Robert Burman	America	4	5.1	5.5	449.4
2....	Stutz	Earl Cooper	America	4	..	..	....
3....	Stutz	Barney Oldfield	America	4	..	..	....
4....	Gray Fox	Howard Wilcox	America	4	5.0	5.5	431.9
5....	Beaver Bullet	Charles Keene	America	4	5.1	5.5	449.4
6....	Peugeot	Jules Goux	France	4	3.9	7.0	341.7
7....	Peugeot	Georges Boillot	France	4	3.9	7.0	341.7
8....	Maxwell	Teddy Tetzlaff	America	4	4.2	8.0	445.0
9....	Sunbeam	Jean Chassagne	England	6	3.0	5.9	245.0
10....	Delage	Albert Guyot	France	4	4.1	7.0	380.2
12....	Excelsior	Josef Christiaens	Belgium	6	3.8	6.2	446.6
14....	Peugeot	Arthur Duray	France	4	3.0	6.1	183.0
15....	King	Arthur Klein	America	4	5.1	5.5	449.4
16....	Delage	Rene Thomas	France	4	4.1	7.0	380.2
17....	Burman	Louis Disbrow	America	4	5.1	5.5	449.4
18....	Mercedes	Ralph DePalma	Germany	6	4.1	5.5	445.0
19....	Mercer	Spencer Wishart	America	4	4.8	6.2	445.0
21....	Mercer	Caleb Bragg	America	4	4.8	6.2	445.0
22....	Mercer	Edwin Pullen	America	4	4.5	5.0	300.0
23....	Mercedes	Ralph Mulford	Germany	4	4.4	7.2	448.0
24....	Stutz	Gilbert Anderson	America	4	..	..	....
25....	Maxwell	William Carlson	America	4	4.2	8.0	445.0
26....	Marmon	Joseph Dawson	America	4	4.5	7.0	445.0
27....	Sunbeam	Harry Grant	England	6	3.1	5.9	273.0
28....	Stafford	Jesse Callahan	America	4	4.2	5.1	290.7
29....	Metropol	Joseph Horan	America	4	4.2	7.1	446.0
31....	Keeton	William Knipper	America	4	5.1	5.5	449.4
32....	Maxwell	.....	America	4	4.2	8.0	445.0
33....	Texas	George Clark	America	4	5.1	5.5	449.4
34....	Bugatti	Ernst Friedrich	Germany	4	3.9	7.1	350.0
35....	Great Western	John Jenkins	America	4	4.2	8.0	445.0
36....	Great Western	Roy Price	America	4	3.7	5.7	254.0
37....	Great Western	Guy Ball	America	4	4.2	8.0	445.0
38....	Braender	William Chandler	America	4	4.4	6.0	350.0
39....	Pope Bullet	Mortimer Roberts	America	4	4.7	5.7	407.6
41....	Washington	Melvin Stringer	America	4	4.7	5.7	407.6
42....	Dusenber	E. V. Richenbacher	America	4	4.4	6.0	360.5
43....	Dusenber	Willie Haupt	America	4	4.4	6.0	360.5
44....	Mason	George Mason	America	4	4.4	6.0	360.5
45....	Tatter	Joseph Mazzucco	America	4	4.1	5.3	286.0
46....	Rayfield	Hugh Hughes	America	6	4.1	5.5	442.6
47....	Titze	Fred Melan	America	4	5.1	5.5	449.4
48....	Ray	S. P. Brock	America	4	5.1	5.5	449.4
49....	Isotta	Ray Gilhooley	Italy	4	4.7	6.3	443.8



**Remy Trophy for Leader
at 200 Miles.**

annual salary of many a bank president. The prizes offered are set forth in an accompanying table. The G & J trophy will be awarded to the car finishing the first 100 miles in the lead. It was not placed in competition last year, although it has been in existence for several years. The car in the lead at 200 miles will receive the Remy trophy and brassard, now held by Goux. The Prest-O-Lite trophy goes to the car in the lead at 300 miles, and the Wheeler & Schebler trophy to the machine leading at 400 miles. Both of these also are held by Goux. The only condition attaching to these four trophies is that the cars winning them shall finish the race. The Rayfield trophy goes to the winning car, provided it is fitted with a Rayfield carburetor.

Two entirely new prizes are offered this year, one being the Bosch award of \$500, cash, for the car fitted with Bosch ignition exceeding the National's record, and the other, the Waltham efficiency prize.

This latter consists of a handsome Waltham watch, which will go to the car which spends the least time at the pits.

Every precaution has been taken to protect drivers, officials and spectators from accident. A new bridge has been made over the speedway at the starting line, on which the starter and other officials will stand, instead of taking their chances on the track.



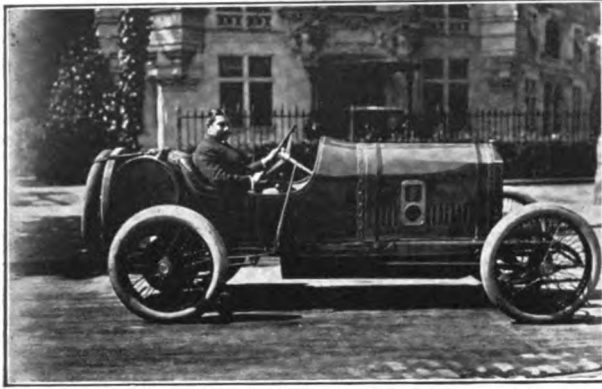
**Rayfield Trophy for 500-Mile Ray-
field Equipped Winner.**

PRIZE WINNING POSSIBILITIES IN ANNUAL INTERNATIONAL SWEEPSTAKES.

Special Prizes.		Third Place.	
Rayfield trophy, 500 miles.....	\$2,000	Speedway prize	\$5000
Wheeler & Schebler trophy, 400 miles.....	10,000	Carburetor, Rayfield	\$200
Prest-O-Lite trophy, 300 miles	2,750	Schebler	200
Remy trophy and brassard, 200 miles.....	2,500	J-B Company	200
G & J trophy, 100 miles.....	1,500	Longuemalre	200
Waltham Watch Company, least time at pits.....	500	Magneto, Bosch	200
Winner.		Spark plugs, Bosch	100
Speedway prize	\$20,000	Red Head	100
Tires, Firestone, bonus for 1913.....	3,000	Shock absorbers, Ames	100
Carburetor, Rayfield	\$1000	Truffault-Hartford	100
Schebler	1000	Wire wheels, Standard Roller Bearing Co....	125
J-B Company	1000	Tanks, Janney, Steinmetz Company.....	25
Longuemalre	1000	Total.....	\$5750
Magneto, Bosch	500	Fourth Place.	
Remy	1000	Speedway prize	\$3500
Spark plugs, Bosch	100	Carburetor, Schebler	100
Red Head	500	Total.....	\$3600
Shock absorbers, Ames	250	Fifth Place.	
Truffault-Hartford	250	Speedway prize	\$3000
Wire wheels, Standard Roller Bearing Co..	500	Sixth Place.	
Tanks, Janney, Steinmetz Company.....	75	Speedway prize	\$2200
Breaking record with Bosch Ignition.....	500	Seventh Place.	
Total.....	\$26,825	Speedway prize	\$1800
Second Place.		Eighth Place.	
Speedway prize	\$10,000	Speedway prize	\$1600
Tires, Firestone, bonus for 1913.....	1,000	Ninth Place.	
Carburetor, Rayfield	\$300	Speedway prize	\$1500
Schebler	300	Tenth Place.	
J-B Company	300	Speedway prize	\$1400
Longuemalre	400	Grand total of all prizes offered.....	\$85,125
Magneto, Bosch	300		
Spark plugs, Bosch	100		
Red Head	250		
Shock absorbers, Ames	150		
Truffault-Hartford	150		
Wire wheels, Standard Roller Bearing Co..	250		
Tanks, Janney, Steinmetz Company.....	50		
Total.....	\$12,400		

DETAILS OF CARS IN FOURTH 500-MILE RACE.

MANY of the machines entered for the forthcoming Indianapolis contest are specially designed, this applying even to some which bear



Georges Boillot and His Grand Prix Peugeot.

the names of standard cars in the open market. The winning of the third race of this series by a French product has served to increase interest in the event on the part of several manufacturers who are making unusual efforts to secure the return of the trophies to America, and this is likewise true of individuals who have been instrumental in the production of cars bearing unusual names. For the most part manufacturers jealously guard the constructional details of their racing machines, but it is proposed to present herein some of the features of several machines, which have been made public.

The Delage Cars finished first and second in the Grand Prix de France at Le Mans, last August, running 350 miles at an average of 76.8 miles an hour. They also competed in the International Grand Prix at Amiens in July, the distance in that event being 570 miles. In each

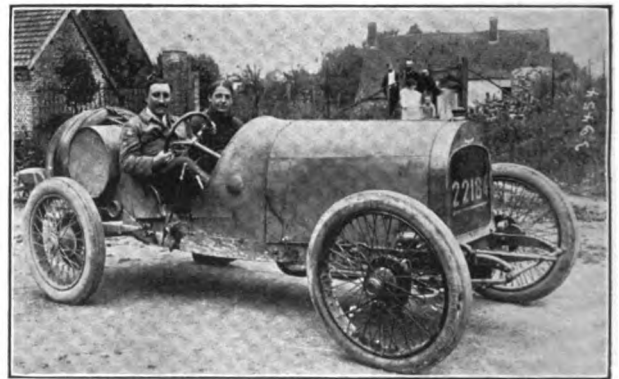


Jean Chassagne at the Wheel of the Sunbeam.

contest both cars went through the race without mechanical adjustment.

Ball bearings are used throughout in the block motor, and to secure rigidity, as well as lightness, an H section girder is carried under each main bearing. The motor is placed directly on the main frame members, while the five-speed gearbox has three point suspension, the connection between the two being the multiple disc clutch. Two independent magnetos are fitted, and each cylinder has four horizontal valves, operated by vertical pushrod and bell crank, having two arms and actuating a pair of valves.

A gear pump, driven off the intake camshaft, delivers oil through a collector, in which are a hand regulated valve and three leads, one to the main bearings, one to the overhead valve gear, and one to the dashboard pressure indicator. The function of the pump is limited to supplying lubricant to specially designed cages around each



Josef Christiaens and the Excelsior Six.

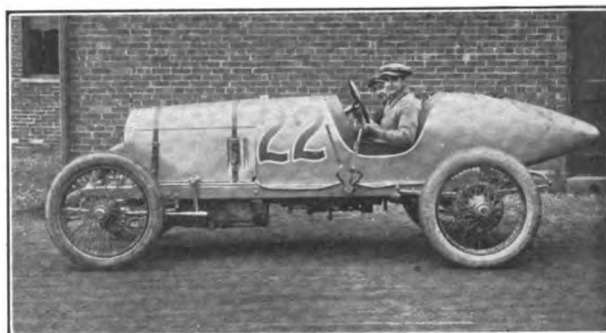
ball bearing. In addition to the oil in the base chamber, there is an auxiliary tank on the dash with a feed to the motor, the flow from which is regulated according to the conditions under which the motor is running. To prevent an excess, in case of inattention or for any other cause, there is an overflow on the side of the chamber, the superfluous oil being lost on the road.

The Two Larger Peugeots are the machines used by Boillot and Goux in finishing first and second in last year's International Grand Prix. They differ in several respects from the car used by Goux in winning the 500-mile race in 1913. The third Peugeot is the smallest car in the race, and is the machine with which Boillot won the Coupe de l'Auto at Boulogne.

On the front of the motor is a short cross shaft driving a combined oil and air pump at one-

third engine speed. Ordinarily this pump aspires pure air, and, through a pressure regulator, maintains a predetermined pressure on the lubricant tank set within the frame under the driver's seat. By reason of this pressure the lubricant is driven through a single feed pipe to the dashboard distributor, thence through five leads to the crank chamber, overhead camshafts and to the pump and magneto shafts in front, in a powerful stream. There is no provision for the cylinder walls other than by the oil working out of the main bearings and kept in suspension within the motor. As soon as the oil returns to the base chamber it is drawn up and returned to the tank.

Another feature is the provision for taking up wear on the brakes while the car is travelling at high speed. Steel cables attached to the brake levers are brought through the frame and hooked onto short sliding sleeves on a tubular cross member. These two sleeves are connected by a horizontal screw with left and right hand threads, by means of which they can be brought closer



Edwin Pullen in the Specially Designed Mercer.

ber, is in a tank at the rear of the chassis, from which it is led to a pump in the base chamber by means of a large pipe. This pump forces the lubricant to all bearings, etc., after which it returns to the base, when it is forced back into the tank by a secondary pump. It is maintained that in this manner the oil is not long subjected to the heat of the crankcase.

Pullen's Mercer is somewhat different from those of his teammates, having a motor of much smaller piston displacement. In outward appearance it differs materially from the standard design of Mercer cars used heretofore in contest work. There is no secret in the statement that the Mercer organization is making every effort to add the 500-mile race to its recent Grand Prize victory, and the pronounced streamline, cigar shaped body is expected to show decided wind resisting qualities. In fact, the design was suggested by cars which have been making record breaking performances on the Brooklands track in England. Pullen is said to have developed better than 100 miles an hour with this car in tests on the factory track.

The Three Maxwells were designed by Ray Harroun, winner of the first 500-mile race in 1911, and are not standard productions of this company. There is no flywheel, counterweights



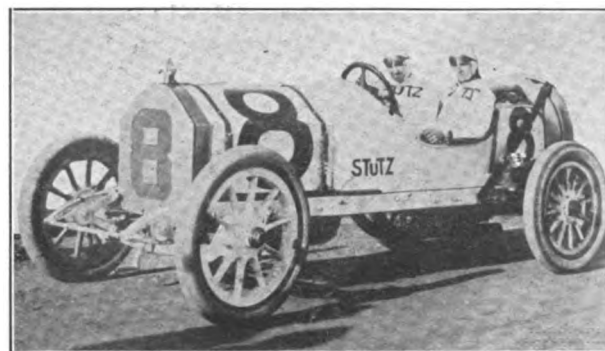
Teddy Tetslaff and One of the Maxwell Cars.

together, thus shortening the length of the cable. The screw is just under the floorboards and can be reached by lifting a trap.

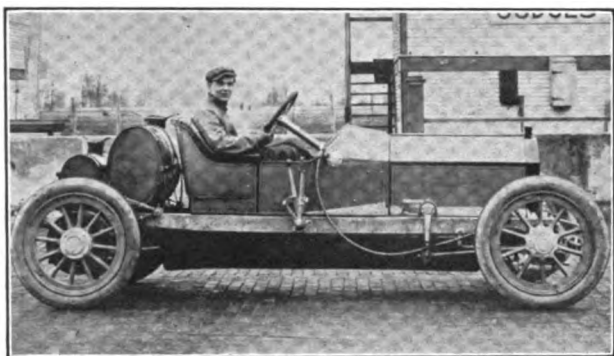
Chassagne's Sunbeam has been specially designed for this race, using the motor with which he recently secured the 12-hour record on Brooklands track in England, averaging 89.95 miles an hour. Grant's Sunbeam took part in the International Grand Prix of 1913, and does not depart greatly from the standard touring car chassis made by this concern.

The former has wheelbase of only 83 inches, which has made necessary redesigning the gearbox. This has very short shafts and affords but two forward speeds. It is carried on the same subframe as the engine, being hung from the main frame by three universal hangers. Two carburetors are employed.

Modifications of the oiling system have been made with a view to cooling. The bulk of the oil, instead of being carried in the base cham-



Earl Cooper, 1913 Racing Champion, in Stutz.

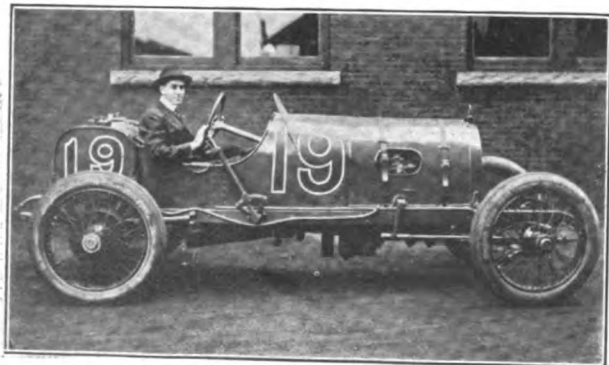


Joseph Dawson and the Privately Owned Marmon.

on the three bearing crankshaft of the block motor taking its place. Reciprocating parts have been made exceptionally light, but the cylinders, crankcase and engine base are said to be nearly 50 per cent. heavier than ordinarily employed, even in racing practise, to keep down vibration.

Most racing cars are supplied with extra oil needed at exceptionally high speeds by a hand pump, operated by the mechanic. In case of pump failure for any reason, this results in insufficient lubrication. Harroun claims to have solved this difficulty. The oil is forced by an engine driven pump through large pipes directly from the tank at the rear to the engine bearings, the cylinders being lubricated by spray, but there is no splash chamber in the crankcase. Normally the pump feeds too much oil when the engine is operating at high speeds, so that the crankcase fills too rapidly, unless the hand pump is utilized to force some of it back to the tank through a bypass without going to the engine.

The Bugatti Entry was specially designed by Ettore Bugatti of Molsheim, Alsace, Germany, assisted by the driver, Ernst Friedrich. It is an open secret in Europe that the former is responsible for some of the best work on French cars, although he regularly produces machines bearing his own name. Beyond the statement that this



Spencer Wishart at the Wheel of His Mercer.

car is fitted with a block motor, with 12 overhead valves, operated by inclosed gearing, and that no expense has been spared for materials or workmanship, nothing has been made public concerning it.

The Two Burman Cars were built under the personal direction of Robert Burman at Battle Creek, Mich. The motor is of his own design and is made by the Wisconsin Engine Company. The 16 valves in the head of the cylinders are operated by overhead camshaft. The chassis design is said to incorporate a number of ideas gathered by Burman during his European trip last year.

The King Entry is said to be the only machine in the race equipped with full cantilever springs. In this respect, as well as in others, it follows standard practise with the product of this company. The car was constructed under the supervision of its driver, and it will be noted



Albert Guyot and One of the Delage Entries.

that the body is specially designed for racing at high speed. It will use a Bosch double ignition magneto, Bosch plugs, Zenith carburetor, Rudge-Whitworth wire wheels, Empire and Braender tires and Havoline oil.

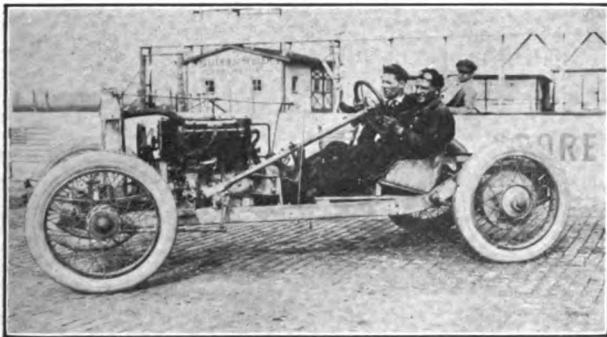
The Three Great Westerns are fitted with the new Carter piston valve motor, which is standard equipment on Great Western machines this year. The company states that no attempt is being made to make the ports larger to give them better area for racing purposes, and that it is depending on the great difference in the time of opening and closing of the valves to more than make up for the valve area of the poppet valve motors, and also for securing a speed equal to that of cars in the race with almost double the piston displacement.

The Braender Car is entered by the Braender Rubber & Tire Company, maker of tires bearing

that name. Practically nothing is known concerning this machine, except the bore and stroke, and the fact that it was designed by Ralph Mulford, who drove a Mercedes fitted with Braender tires in the 500-mile race of last year. And it may be noted that this was the first car that ever went through a race of that distance with a set of four tires which were not changed from beginning to end.

The Keeton is the machine that Robert Burman drove in last year's race. It is understood to be a standard production. It is Burman's private entry, and in last year's event it covered one lap of the course in 1:37—the fastest of the race.

The Six-Cylinder Excelsior was specially designed by its driver, Josef Christiaens, for the International Grand Prix of 1913. The only information that has been made public concerning this machine, is that the motor is cast in blocks

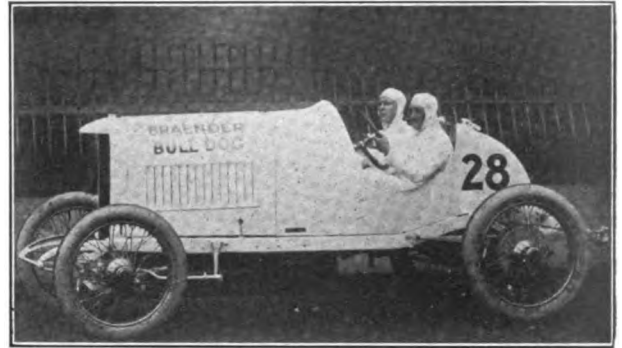


John Jenkins and Great Western Stripped Chassis.

of three, with valves all on one side; that the crankshaft is carried in seven plain bearings, to which oil is delivered under high pressure; that two carburetors are employed, and that the transmission comprises a cone clutch, four-speed gearbox and shaft drive.

The Stutz Company is giving out absolutely no information concerning the three machines of its make in the event. It was in the first 500-mile race that the first Stutz car made an enviable reputation by completing the entire distance without mechanical adjustment. It is well known that the Stutz company expects to take this race, and it is suspected that the three cars have been so geared as to be able to cover the course at from 80 to 90 miles an hour, with ease.

DePalma's Mercedes is fitted with a six-cylinder aeroplane type engine, but in other respects resembles the Mercedes machines with which he has been racing for some years. In fact, it is stated that it is the same machine with which



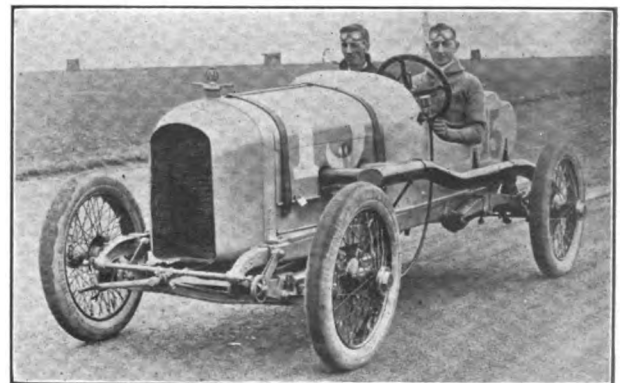
William Chandler and the Braender Bull Dog.

he took the 1912 and 1914 Vanderbilt cup races, aside from the engine. Mulford's car is understood to be a regular racing model. The same thing holds true of the Isotta.

The Metropol made its first appearance in the American market last fall. It is a four-cylinder car, regularly produced by the Metropol Motors Corporation of New York City, in Port Jefferson, N. Y., and designed with a particularly long stroke motor, held to be capable of developing unusual speed. This is its initial contest.

Stafford Cars have been produced in limited quantities by the Stafford Motor Car Company, Kansas City, Mo., for the past year or two. No statement has been made public by the concern relative to the car entered, and it is presumed that it follows standard practise in the main. This is its first racing appearance.

The Rayfield has taken part in a number of short distance races, and is regularly produced by the Rayfield Motor Company, Chrisman, Ill. The Marmon is a privately owned machine, the Nordyke & Marmon Company, Indianapolis, maker of the line, having retired from racing some three years ago. Constructional details of Gray Fox, Beaver Bullet, Pope Bullet, Washington, Tatter, Titze and Ray are entirely unknown.



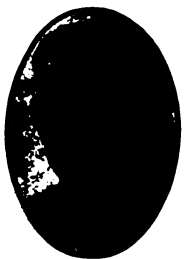
Arthur Klein at the Wheel of the King Oriole.

DRIVERS IN INDIANAPOLIS CONTEST.

Joseph Dawson, winner of the 1912 500-mile race in the National car, which still holds the record, will drive the Marmon 26. Born in Indianapolis, 25 years ago. First season, 1910, won Cobe, Remy Brassard, Vanderbilt Donor's, Atlanta and Savannah Challenge trophies with Marmon; 1911, three starts, no firsts; 1912, won 500-mile race with National; 1913, two starts, won second place in Chicago Automobile Club trophy at Elgin with Deltal. Practically all of his driving has been without stop. Holds world's speedway records, regardless of class, for 300, 350, 400, 450 and 500 miles with National, and several world's class records with the Marmon. His machine this year is privately owned.



Joseph Massucco, who will pilot the Tatter 45, is credited with being an American, despite the very evident Italian origin of his last name. His work as a driver is entirely unknown. It is understood that he and his brother entered this car in order to prove to the industry that a rebuilt machine could be depended upon for high speed under satisfactory circumstances.



Robert Burman, crowned Speed King at the Indianapolis speedway just before the first 500-mile race, will drive the Burman 1. Born, Im-lay City, Mich., in 1884. Tested first Buick car built. Went with Jackson Automobile Company and soon became head tester. First race, 50 miles, in Detroit, 1906, won with Jackson. Won second race, 24 hours, in St. Louis. Went with Buick, and list of winnings with that car would fill a book. Created world's straight-away records with Blitzen Benz.

Arthur Klein will drive the King 15. He is 25 years old. After graduating from college he entered the employ of the Peerless Motor Car Company as tester. Later with Stoddard-Dayton when that concern built racing cars. Has driven in several events. This is his first big race and he will be its youngest driver.

Barney Oldfield, one of the best known American drivers, appears in this race with the Stutz 3. After creating all manner of world's records in cars of several differing makes, Oldfield was suspended by the contest board of the American Automobile Association early in 1911, and was reinstated late in 1912. Drove Fiat and Mercer cars in a number of events on the Pacific Coast in 1913. Finished in second place with a Mercer in this year's Vanderbilt Cup race and recently created a new dirt track record with a Fiat.



Mortimer Roberts will pilot the Pope Bullet 39. He has been driving for a number of years and has earned an enviable reputation in both long and short distance events. In 1911 he won the Aurora cup with an Abbott-Detroit, and in 1912, he took the first race for the Pabst Blue Ribbon trophy, held in connection with the Vanderbilt and Grand Prize events at Milwaukee.



George Clark will drive his Tulsa of last year's race in this event as the Texas 33. Began driving Jackson cars in 1909. Received a medal from the motorists of San Antonio, Tex., for saving a life during the races in that city in November, 1909. Outlawed by the contest board of the American Automobile Association from 1909 to 1912. Drove Mercedes to victory in several events in the southwest in 1912. Finished third in 200-mile free-for-all on Galveston beach that year.

Jules Goux, winner of the 1913 500-mile race in a Peugeot, will be at the wheel of the Peugeot 6. A modest Frenchman, who has driven Peugeot cars to victory in a number of racing events on the Continent. Won the Sarthe Grand Prix of 1912, averaging 73 miles an hour for the 402 miles, and creating a new European record for the distance. Previous to winning last year's 500-mile race, he created a new one-hour record on the Brooklands track in England. Finished second in the International Grand Prix and the Coupe de l'Auto races in France in 1913. He also serves as racing engineer for the maker of the Peugeot cars. His name is pronounced as though spelled Goo.



Fred Melaun will be at the wheel of the Titze 47. He was prominent in racing circles in 1911, having taken part in seven races, securing four seconds and three thirds. Since then he has been working as a dirt track campaigner, much of the time with Barney Oldfield. This is believed to be his initial appearance on the Indianapolis speedway, and to be his first long distance event.

Harry Grant, twice a winner of the Vanderbilt cup with the same Alco car, will pilot an English Sunbeam. Born in Cambridge, Mass., July 10, 1877. Entered automobile business in 1898. Joined the forces of the Alco factory at Providence, R. I. in 1905. Drove his first race at Readeville, Mass., in 1907. Made a clean sweep of the Readeville races in 1908. Won Vanderbilt cup in 1909 and 1910. Drove Lozier in 1911. Retired to become a salesman in 1912. Drove an Isotta in 1913 500-mile race.



Joseph Horan will drive the Metropoli 29. He is one of the veteran drivers of the industry, although he has not been found among the winners during the past two years. Previous to that time he was prominent as a teammate of Ralph Mulford with Lozier cars, winning several long distance events.

Teddy Tetslaff, who holds the world's road racing record at 78.5 miles an hour with a Fiat, will drive the Maxwell 8. A native of California, he came into prominence with a Lozier car in the Santa Monica race of 1910, when he created a new American road record. Began driving a Fiat in 1911, when he defeated DePalma in a 100-mile race at Los Angeles. Won Santa Monica race and 200-mile and free-for-all at Tacoma, and finished second in the 500-mile race in 1912. Last year he won the Owensmouth trophy at Los Angeles.

Arthur Duray, who has travelled at a speed of 142.9 miles in an hour in his 300 horsepower Fiat, will drive the Peugeot 14. Born in New York, but has lived in Paris since boyhood. Has driven Delage and other cars in numerous events on the Continent. Will drive the smallest car in this year's 500-mile race. His first racing appearance in America.

Albert Guyot, pronounced Gee-O, with the G hard, will be at the wheel of the Delage 10. He has been prominent among racing drivers in Europe for years and there have been few big events in which he has not been numbered among the entrants. Hundreds of medals and trophies possessed by him are testimonials to his success. In the 500-mile race of 1913 he drove a Sunbeam. Upon his return to France he became a teammate of Bablot with the Delage. He also is an aviator of some note.



Edwin Pullen, winner of this year's Grand Prize in a Mercer, will drive the Mercer 22. Entered the racing field as mechanic for Spencer Wishart. Became prominent as driver of Mercer cars in 1912, when he took the 150-mile event at Tacoma, and secured a number of minor victories. In 1913 he failed to win a race of the three in which he was entered. His victory in the 1914 Grand Prize placed him in a position of decided prominence because of the fact that this was the first time an American car had won this event.



Earl Cooper, America's racing champion in 1913, will pilot the Stutz 2. Native of Nebraska and 30 years old. Drove his first race at 17, and won with a single-cylinder Cadillac. Has been driving Stutz cars since 1911. Entered three races that year, won one. Won four out of six in 1912, including 150-mile event at Tacoma. Covered 1595 miles in races in 1913, winning six out of seven long distance events—heavy cars, Corona; free-for-all, Corona; Santa Monica; Potlach trophy, Tacoma; Montmarathon, Tacoma, and 200 miles, Fresno.

Jean Chassagne (Chas-saw-in) will drive the Sunbeam 9. A Frenchman occupying the position of chief racing engineer to the Sunbeam company in England. Has taken part in a large number of important events on the Continent and the Brooklands track, Weybridge, England. Holds 12-hour record with Sunbeam on Brooklands track. Has served in the French navy and has something of a reputation as an aviator. First appearance in America.

Ray Gilhooley will pilot the Isotta 49. He is one of the older racing drivers, whose name has not been found among the contestants in recent years. Ralph DePalma once said of him that he was the only man he feared, because he never could tell what the "wild Irishman" was going to do next. Twice, he has crashed through a wooden fence at full speed, only to return to the course and continue the race to its finish. It will be his first contest on the Indianapolis speedway.



Louis Disbrow will drive the Burman 17. He has been racing for nine years and has appeared in all the big meets of the country, being a winner time and time again. In both 1912 and 1913 his name was second on the list of drivers for number of starts and victories. Holds numerous records, created with cars of several different makes. Has competed in all the 500-mile races, and has driven in most of the prominent hill climbing events. Won several free-for-all events on Galveston beach.

Ernst Friedrich, pronounced Freed-rish, will drive the Bugatti 34. Born in Alsace-Lorraine, and is typically French, despite his German moniker. As driver of the smallest racing car in Europe he has won for himself an enviable reputation, having defeated machines five and six times the size of his own, both in hill climbing and road events. This is not only the first time he has appeared in America, but the first race over a specially prepared speedway course, in which he has competed.



Willie Haupt will be at the wheel of the Dusenber 43. His home is in Philadelphia, where he is particularly well known as a hill climb driver, having secured a large number of records in such events. First drove a Chadwick in 1907, and later an American. Established two records on Point Breeze track with a Thomas in 1910. Drove a National early in 1911 and changed to a Buick later in the year. Drove a Mason in 1913 500-mile race.

John Jenkins, who retired from racing for good in 1912 and came back in 1913 to drive a Schacht in the 500-mile race of 1913, will be at the wheel of the Great Western 35 this year. He is an ex-puglist, and has two broken hands as a result of his work in that field. Born 35 years ago, he saw his first racing experience with Venus, an Italian driver, in Europe, and first raced in America in 1910. It was during a 24-hour race at Los Angeles in 1911 that he became prominent, driving a Cole.



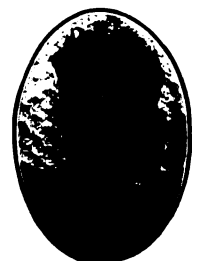
Spencer Wishart, credited with being a millionaire, will pilot the Mercer 19. He is 25 years old. Withdrew from New York society circles a few years ago to enter the racing field. Until 1913 he pinned his faith to cars of foreign make, entering and driving his own machines. Joined the Mercer team late in 1912. Created world's dirt track record for 200 miles in Mercer at Columbus, O., that year. Finished third with a Mercer in 1912 Vanderbilt cup event, and second in the 1913 500-mile race.

Hugh Hughes, formerly head of the Mercer racing team, will pilot the Rayfield 46. He is an Englishman, 28 years old. Drove a De Dietrich car in the 1904 Gordon-Bennett race in France. Brought Allen-Kingston to this country for 24-hour contests. Went with Walter Christie to drive the Christie front-drive racer. Drove Parry cars in 1910, then went with the Fal-Car. Organized Mercer team in 1911. Won Kane county trophy, 1911; Aurora cup, 1912.

Charles Keene, driver of the Beaver Bullet 5, formerly was connected with the Mercer factory force. Inasmuch as he is now a resident engineer in Beaver Falls, Penn., and as his name does not appear on the list of winning drivers for the past three years, it is assumed that he was an engineer rather than a driver, while with that company. However, he is a veteran racing man, having been a member of the Pope-Toledo racing team in 1903. Before that he was a road tester.

William Carlson will drive the Maxwell 25. Carlson was practically unknown, outside of Pacific Coast racing circles, until the recent Vanderbilt cup race, in which he finished third with a Mason car. He won his first big race, a 200-mile event, at Point Loma, San Diego, March 2, 1913, being the only man to defeat the Cooper-Stutz combination on the Coast last year. In that event he drove a Benz. That he has been selected as a teammate for Tetzlaff is a measure of his reputation as a careful driver.

Roy Price, who will be Jenkins' teammate at the wheel of the Great Western 38, is one of the few drivers in the race about whom very little is known. It is understood that most, if not all, of his previous work has been as an amateur, and that his racing experience has been confined to local events in and about Peru, Ind., where the Great Western is produced. That he was selected by Jenkins, who is largely responsible for the Great Western racing team, is evidence that he is considered an excellent driver.



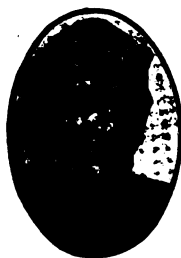
Rene Thomas, known as the Parisian acrobat, is the pilot for the Delage 16. Thomas, pronounced Tohmah, gained an enviable reputation as a motor bicycle rider in the earliest days of the industry, and is said to possess sufficient medals to cover the walls of his dining room. During the last few seasons he has been driving Schneider cars, changing to the Delage this year. Although his name did not appear among the winners of long distance events abroad in 1913, his work has been such as to make him a warm favorite.



Georges Boillot is a teammate of Jules Goux in the Peugeot 7. Like Goux, he is a racing engineer for the Peugeot company and has a large number of foreign victories to his credit. Won the International Grand Prix at Amiens, France, in 1913, and also the Coupe de l'Auto at Boulogne later in the year. This is his first appearance in America, and because of the fact that he defeated Goux twice in the important events mentioned above, he is looked upon as a favorite, as between these two. His name is pronounced Boll-O.

William Chandler will be at the wheel of the Braender Bull Dog 38. While he has been driving cars of various makes for several years, he came into particular prominence last year as a Mason pilot, winning 12 firsts, six seconds and two thirds out of 22 starts. He finished second with a car of that make in the 100-mile free-for-all on Galveston Beach, and in the 100-mile race at Latonia, Ky. His car was specially designed by Ralph Mulford and is entered by the maker of Braender tires, which were used with splendid success last year.

Joseph Christiaens (Krees-ti-an) will be at the wheel of the Excelsior 12. Native of Belgium, about 30 years old. Associated with Darracq at the inception of the industry. Later went with Vivinus company in Belgium as chief engineer. Took Liederkkerke cup in 1909. Among the first 12 men in Europe to secure aviator's license, with Voisin biplanes. Last three years with Excelsior as chief of racing department. Holds all the world's records in the 850-cubic inch class. Has covered a half-mile at 108.3 miles an hour, and a mile at 106.86.



Gilbert Anderson, the man who made the Stutz famous in a day during the first 500-mile race, will drive the Stutz 24. Born in Norway, came to this country as a boy, and became a marine engineer. As mechanic for Monsen in Crown Point races of 1909, lay for 50 miles on the hood of a Marmon car adjusting carburetor. Finished second with Stutz in Fairmount park race, 1911. Finished second in Illinois trophy race, and third in the Grand Prize, 1912. Won Elgin National trophy in 1913.

Ralph DePalma, twice a winner of the Vanderbilt cup, will drive a six-cylinder Mercedes, fitted with an aeroplane type engine. Made his debut in Briarcliff road race, April, 1908. Has secured many world's records, and won many victories since. Won Jepson cup, Santa Monica, with Mercer, and Elgin National trophy and Vanderbilt cup with Mercedes in 1912; Chicago Automobile Club trophy with Mercer in 1913, and Vanderbilt cup at Santa Monica in February, 1914, with Mercedes.



Guy Ball will drive the Great Western 37. His name first appeared on the list of winning drivers in 1912. Last year he finished second in the Los Angeles-Phoenix road race, driving a Marmon car. And it was at the wheel of another Marmon that he secured second place in the fifth race for the Grand Prize at Santa Monica in February, this year. All of his previous work has been done on the Pacific Coast, and this is his first appearance on the Indianapolis track. His work in the 1914 Grand Prize entitles him to a place among the favorites.

George Mason will drive the Mason 44. He is a son of the president of the Mason company. His first racing experience was at the wheel of a Mason car in the contest for the Wisconsin trophy, held in connection with the 1912 Vanderbilt cup and Grand Prize events in Milwaukee. He finished in second place. His previous work has been confined very largely to road races, and this will be his first appearance on a specially prepared speedway. He is expected to do credit to the house of Mason, however.

Howard Wilcox, holder of the world's stock chassis straightaway mile record in a National car, will drive the Gray Fox 4. Born, Crawfordville, Ind., 25 years ago. Won in his first race at New Orleans, Nov. 20, 1909. Won 100-mile race, Amarillo, Tex., 1911. Was a member of the winning National team in the 500-mile race of 1912, and retired to go into the taxicab business with Donald Herr when the National company withdrew from racing. Drove a Fox special in last year's 500-mile race.



William Knipper will drive the Keeton 31, this being the same car in which Robert Burman competed in several events in 1913. First race in Chicago in 1904. Competed for Gordon Bennett trophy in France in 1905. Drove Thomas car in hill climbing events in 1906. Drove first machine through to Mexico City in 1909. Won Lowell road race and 100-mile race at Atlanta in 1910. Won International light car race at Savannah in 1911. Competed in first 500-mile race with Benz, and 1913 event with Henderson.

S. P. Brock will be at the wheel of the Ray 45. He is a resident of Portland, Ore., where he is well known as a motor boat expert, owning one of the two claimed to be the fastest gasoline craft afloat. So far as can be learned he has had no previous automobile racing experience—certainly not in long distance events on a specially prepared speedway. His machine was built in Indianapolis under his personal supervision.

Jesse Callahan, pilot of the Stafford 28, is one of the old time drivers whose name has not been found among those taking part in contests during recent years. He is considered a careful man at the wheel. Melvin Stringer, who will drive the Washington 41, is almost as little known as the car he will pilot. He has taken part in a number of minor events in the Middle West, however. One car, the Maxwell 32, is as yet without a driver.



Caleb Bragg, winner of the 1912 Grand Prize in a Fiat, will be at the wheel of the Mercer 21. Born in Cincinnati, O., 26 years ago. Raced as an amateur until 1910. Won two out of four races entered in 1911. Finished second in Santa Monica road race, and took three out of four events entered in 1912, including the Grand Prize. His success last year was by no means as marked, having failed to secure place in any event. Holds a number of speedway records, made with a Fiat.

Ralph Mulford, who made his debut as a professional racing driver six months after he learned to handle a car, will pilot the Mercedes 23. He is 29 years old. First race, with Lozier, at the Point Breeze track, Philadelphia, in 1907, when, with Harry Michener, he set a new world's 24-hour record. Won Elgin National trophy in 1910 and Vanderbilt cup in 1911, both with Lozier. Drove Knox cars in 1912. Won 200-mile race at Columbus, O., and took several minor events with Mason in 1913.



SPECIAL AMES PRIZES.

Clarence N. Peacock & Co., Announces Awards for Users of Ames Shock Absorbers.

An entirely unexpected feature in the prizes to winning drivers in the fourth annual international sweepstakes, 500-mile race at Indianapolis, Memorial Day, is the offer of three awards to users of Ames shock absorbers, by Clarence N. Peacock & Co., 1790 Broadway, New York City, exclusive licensee for this make. The purse is \$500, divided as follows: Winner, \$250; second place, \$150; third place, \$100.

The surprise comes from the fact that heretofore this concern has made no bid for racing equipment. The Ames equalizing spring, as the device is termed, is rapidly coming to the front, and it is expected that there will be several cars in the contest equipped with this product.

MILLER TIRES AND RACING.

Tetzlaff and Carlson Will Drive Machines Fitted with This Make of Shoes.

Ever since Teddy Tetzlaff secured the world's road racing record in the Santa Monica race of May 4, 1912, using Miller tires, made by the Miller Rubber Company, Akron, O., he has been a consistent advocate of this make of shoe. It is not surprising, therefore, to learn that his Maxwell, in the forthcoming 500-mile race, will be fitted with Miller equipment.

It is understood, as well, that the two other Maxwell cars will use Miller tires. One of the drivers has not been named as yet, but William Carlson will act as Tetzlaff's teammate, and he has followed the example set by the record holder.

GRAPHITE IN MAXWELL CARS.

Product of the Joseph Dixon Crucible Company Being Used by Racing Designer.

The three Maxwell cars built by Ray Harroun for the forthcoming 500-mile race on the Indianapolis speedway, will contain several novel lubricating features, as set forth in more detail elsewhere in this issue. In addition, it is stated that Dixon's graphite lubricants, made by the Joseph Dixon Crucible Company, Jersey City, N. J., will play an important part in these machines.

The faces of all bearings and pistons will have many small holes drilled in them, and these

holes will be filled with Dixon's lubricating graphite. In this manner, Harroun expects to provide lubrication not possible with oil alone. Should the oil feed fail, it is anticipated that the graphite will still insure sufficient lubrication. All the bearings, axles, etc., throughout the entire machine will also be taken care of by Dixon's graphite automobile lubricants.

In view of the fact that Ray Harroun is well known as one of the country's foremost racing drivers, having won the first 500-mile race, and a score of other important events, his use of the Dixon graphite lubricants in this connection is worthy of special mention, and of particular interest to motor car owners and users.

CRESCENT TUBE GUARD.

Protects Tube from Pinching, Chafing and Punctures Without Sacrificing Resiliency.

The Dahl Company, 1309 Race street, Philadelphia, maker of the Dahl punctureless tire, is marketing the Crescent tube guard, a resilient, durable cushion strip from .625 to one inch thick, according to the tire size, which is placed between the tube and the tread of the shoe. The function of the guard is to raise the tube out of reach of puncturing material, and it is stated that the insertion of the guard in the casing and its use does not interfere in any way with the tube. The guard is made with butted ends, and is retained in position by reason of the air pressure in the tube and is a perfect fit. In addition to preventing punctures it is held that the guard reinforces the casing.

HAS NARROW ESCAPE.

Factory of Commerce Motor Car Company in Detroit Exposed to Fire Danger.

The Commerce Motor Car Company of Detroit, maker of Commerce trucks, had a narrow escape from serious damage by fire May 22, when an explosion in the adjoining plant of the Mexican Crude Rubber Company caused the complete destruction of that building.

While the explosion was of sufficient force to cover several Commerce workmen, engaged in assembling delivery cars, with a shower of glass, the damage to the Commerce plant was restricted to broken windows. Sales Manager George B. Wilcox reports that production in his plant will not be interrupted.

ELECTRIC CAR CONVENTION.

New England Section Takes Action on Motor Truck Bill in Massachusetts.

Electric vehicle men from all over the New England states were present at the two-day convention of the New England section, Electric Vehicle Association of America, in Boston, May 19-20. Day Baker, president of the Electric Motor Car Club of Boston, presided, and several papers of unusual interest were presented, among them being the following:

"The Relative Fields of Electric, Gasoline and Horse Trucks", by H. F. Thompson of the Massachusetts Institute of Technology; "Touring by Electric Automobile", J. S. Codman of S. R. Bailey & Co., Amesbury, Mass.; "Recognition of the Electric", prepared by Hayden Eames of Cleveland, O., and read by Charles H. Miles; "Co-Operation", by William H. Blood, Boston, formerly president of the national body; "Garaging and Service", J. C. Bartlett, Philadelphia; "The Electric Vehicle Association of America", A. Jackson Marshall, executive secretary; "What Constitutes a Good Electric", A. E. Faeh, Cleveland, O., and "Utility of the Electric Vehicle, Pleasure and Commercial", E. J. Bartlett, Cleveland, O.

Action also was taken requesting Governor Walsh of Massachusetts to grant a hearing on the so-called motor truck bill, now before the Senate in that state, under the terms of which motor trucks are to be taxed \$5 a year for the first ton and \$3 a ton above that figure. The bill has passed the house, and the electric vehicle men ask for a hearing before the governor makes his final decision regarding signing it and making it a law.

It is understood that motoring organizations in Massachusetts are preparing to test the constitutionality of the proposed law in the courts.

TO CATCH AUTOMOBILE THIEVES.

Organized Motorists in New York State to Take Decisive Action on the Matter.

During the past two years the list of stolen automobiles in New York State has increased out of all proportion to the increase in automobile owners, as large as the latter is, and it is believed that the thieves employ a regular system in disposing of the machines. To meet this situation and to assist the authorities in apprehending the culprits, the New York State Auto-

motive Association, which comprises nearly 20,000 motorists, is now organizing a bureau for the prevention of automobile theft, and particularly for the express purpose of assisting members in recovering cars which have been stolen.

An expert is now working out the details, and it is expected that when they are completed it will be possible to act promptly upon the receipt of a telegram from any member of the association. The 63 clubs throughout the state are unanimous in actively supporting the new plan.

ANOTHER CLUB ORGANIZED.

Metropolitan Motor Association Is Formed by Motorists in Boston and Vicinity.

Another motoring organization has been added to the long list of such bodies in Boston and vicinity, this being the Metropolitan Motor Association, plans concerning which are said to have been under way for some weeks. The new club is not in any sense a social organization, its chief aim being to work for good roads and good laws, and to represent the whole Metropolitan district in such work.

The officers are: President, Samuel L. Powers; vice president, Charles E. Hatfield; treasurer, Arthur F. Clarke; secretary and assistant treasurer, James Fortescue. The organization will be affiliated with the Massachusetts State Automobile Association and the American Automobile Association. Its headquarters are at 98 Massachusetts avenue.

LOUISIANA JOINS THE LIST.

Automobile Owners of That Commonwealth May Have to Pay License Fee Hereafter.

The annual session of the Louisiana legislature convened in Baton Rouge, May 11, and, almost immediately, a bill was introduced for the licensing of automobiles. Louisiana is one of the very few states which has had no motoring law, hitherto, although the cities and parishes have been permitted to exact certain fees for the use of motor vehicles.

It is understood that the proposed law was laid before the board of directors of the Motor League of Louisiana, and that it has the unanimous indorsement of that board as presented. It is added that it is expected that it will pass both houses without delay, and that it will provide at least \$200,000 annually for improved roads in that commonwealth.

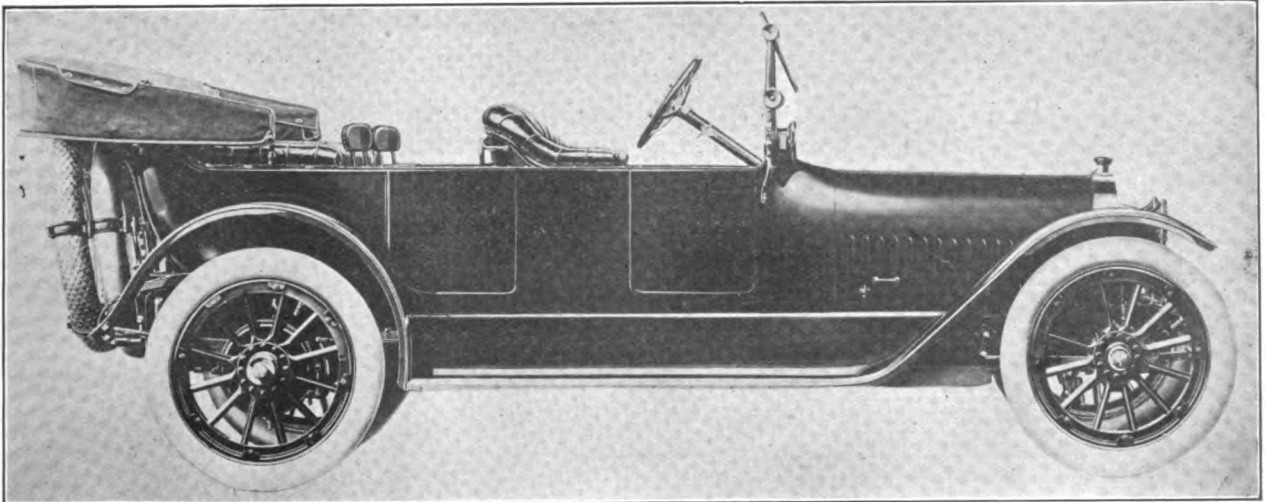
KISSELKAR ADOPTS TWO-DOOR BODY.

THE Kissel Motor Car Company, Hartford, Wis., announces the adoption of a two-door single compartment body as a standard fitting with its new KisselKar 48 Six. The company has been building this design to order for several months and it was first shown at the Boston show. A certain number of chassis were equipped with the body and sent to the leading agencies of the company as samples, which found ready purchasers and were productive of orders for duplicates. This, and the fact that the design makes for convenience, led the company to adopt it as standard for the new chassis.

As will be noted by the accompanying illustrations, depicting a five and four-passenger

the dash. One of the features of the panel is that the body may be displaced without disturbing the wires or their connections. The new body is very attractive and may be classed as a perfect streamline design. The new chassis will also be equipped with the conventional four door, five or seven-passenger bodies, the last named having disappearing seats. The upholstery of the new bodies is of a high grade, long grain, hand buffed leather, and the linings are of the same material.

A number of mechanical features have been refined, but in the main the chassis is constructed along those lines which have proven satisfactory in service. The improvements make for greater



KisselKar 48 Six, a Seven-Passenger Touring Car with Disappearing Seats and Complete Equipment.

body, but two doors are utilized and these are located centrally. These doors are 26 inches wide, providing an easy entrance and exit to both the front and rear seats. The arrangement of the front seats is of particular interest. They are of the individual type, large and roomy, and the design should make for extreme comfort. Between them is an eight-inch aisle, the advantage of which is obvious. It permits a passenger changing from the rear to the front seat, or vice versa, without leaving the car. Where long trips are undertaken this makes possible a change of drivers without stopping the machine.

The individual driver's seat will be appreciated especially when traversing rough roads and in traffic, as there is sufficient room for the operator to swing the wheel quickly without interference. The driver is placed at the left with the control units compactly mounted on a panel on

accessibility, and this is held to be particularly true of the pushrods.

The new motor is built in its entirety in the Kissel plant and is held to be unusually quiet and efficient. Fuel economy and flexibility are also emphasized in the design. It is a block casting with the valves located on the left and the cylinders have a bore of four inches and stroke of 5.5. The S. A. E. horsepower rating of 38.4 is said to be very conservative. All bearings are ample in size and the valves are large, contributing to maximum efficiency.

Carburetion is by a late type Stromberg, water jacketed, and equipped with a control of the air for enriching the mixture for starting. Lubrication is by a force feed system. The oil is forced through a bored crankshaft to all bearings and working parts, being supplied from an ample sized self-contained reservoir to which the over-

flow returns. A special Mayo radiator of the Mercedes type, with belt driven fan, assists the centrifugal water pump, and it is stated that the

The steering gear is of the irreversible worm and worm wheel type and all components are ample in size, making for a large factor of safety.

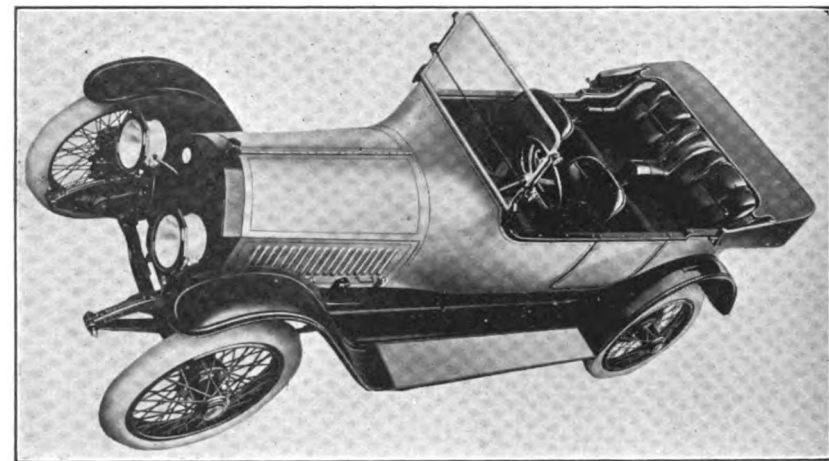
Provision is made for taking up lost motion. The steering column, which is surmounted by an 18-inch wheel, is set at a comfortable angle at the left, with the change speed lever in the centre.

The Kissel electric lighting and starting system comprises separate units and the motor starter is operated by a convenient foot plunger. All indicating instruments are illuminated at night by lamps concealed under a cornice.

The equipment of the new KisselKar is very complete and includes the Golde one-man top, ventilated clear vision

windshield, Solar head and tail lights, Warner speedometer, Klaxet horn, robe and foot rails, jack, pump, tools etc. The headlights are equipped with a dimming device, eliminating need of side lamps. All open bodies mounted on the 48 Six chassis are the same price, and the finish is in keeping with the high grade characteristic of the product of Kissel Motor Car Company.

Although option is given on the ordinary four-door body, the Kissel Motor Car Company



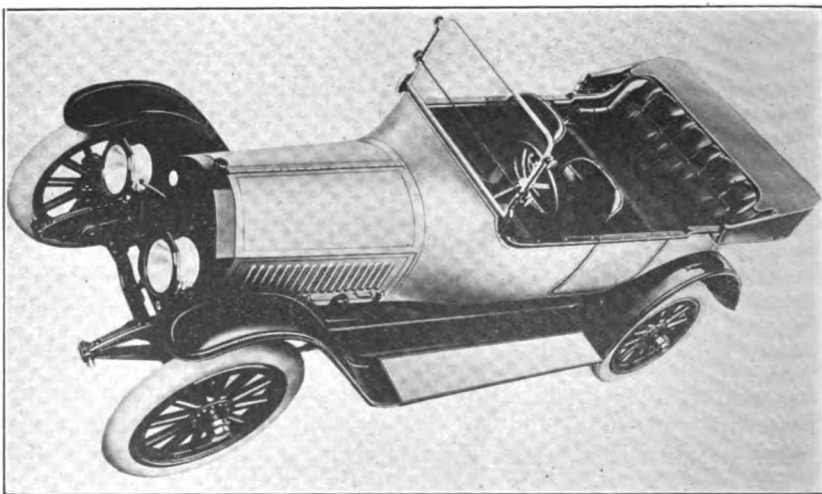
KisselKar Two-Door, Four-Passenger Car with Rear Seats Divided—Note the Spacious Aisle Between the Front Seats.

proper temperature of the water is maintained under the severest of service. The unit power plant is mounted on a special sub-frame, with bearings in front, rear and on either side.

The clutch is a leather faced cone with adjustable spring inserts, and it is readily accessible for inspection or adjustment. The gearset is of the selective type, providing the four forward speeds and a reverse with direct drive on the third. Spicer universal joints are employed between the gearset and the differential. The rear construction is the same design which has proven so efficient in service. All components are sturdily constructed and very accessible.

Both sets of brakes are actuated by pedal, equalized and operate on 14-inch diameter drums with five-inch face. The front springs are semi-elliptic, 38 inches long and 2.25 wide. Three-quarter elliptic members are utilized at the rear, these being 52 inches long and 2.5 wide. Lubrication is by grease cups.

A pressure fuel feed is utilized and the container has a capacity of 24 gallons. It is located at the rear of the chassis, well protected, and is provided with a dial gauge which is illuminated at night through a bull's-eye in the tail light.



New KisselKar Two-Door Body Having Individual Front Seats, Making for Easy Exit and Entrance, and Changing of Seats Without Leaving the Machine.

does not expect that there will be many orders for the design in preference to the two-door type, because of the latter's convenience.

DAWSON SECURES NEW RECORD.

Rounds the 2.5-Mile Course at Indianapolis at 1:36.4 in Four-Year-Old Marmon.

While practising for the forthcoming 500-mile race, May 22, Joseph Dawson, at the wheel of his Marmon, rounded the 2.5-mile oval in 1:36.4. This is the fastest time in which the Indianapolis track has been covered, the previous record having been made by the late Lewis Strang, in 1910, when he drove a 200 horsepower Fiat the 2.5 miles in 1:37 flat. This record was equalled in last year's 500-mile race by Robert Burman in a Keeton.

It may be stated in this connection that the car driven by Dawson is a four-year-old Marmon, made by the Nordyke & Marmon Company, Indianapolis, Ind., but entered in this event by its private owner. It has been driven in a number of contests, having finished fifth in the 500-mile race of 1911. Its S. A. E. rating is 32 horsepower.

TO USE AIRLESS TIRES.

Charles Keene, Driver of the Beaver Bullet, Will Utilize This Product in Race.

A curious side light on the doings of the drivers and mechanics who are preparing their cars for the Indianapolis speedway race, is found in the fact that Charles Keene, driver, and in part the designer of the Beaver Bullet, has received a set of Dayton airless tires, made by the Dayton Rubber Manufacturing Company, Dayton, O., for use in this event. It is stated that the choice was made only after repeated tests with this car, using pneumatics and the airless tires, in which Keene is said to have reported that he found the latter much more resilient than the former.

He is confident that one set of these tires will carry his car throughout the entire 500 miles of the race, and he believes that the question of tire equipment will play an important part in the event. He is said to have found that he is able to take turns at 110 miles an hour, and make even higher speeds on the straight stretches, without tire trouble, using this equipment.

ANNOUNCES KNUTSON STARTER.

Device Made in Two Styles Is Placed on the Market by Automatic Devices Company.

For the past three years, A. W. Knutson, who is well known as the inventor of the rotary trol-

ley retriever, in wide use on electric street and interurban cars, has been working on the development of an automobile engine starter, embracing the same principle. As a result of his efforts he completed the Knutson automatic engine starter, about 18 months ago, and this has been very carefully tested in practical use by a number of drivers since that time.

The device is now being placed on the market by the Automatic Devices Company, Galesburg, Ill. It is of the automatic spring design, strong and simple in construction, and is claimed to require no attention except an occasional oiling. It is being made in two types, one for Ford cars and the other for all kinds of machines, and it is stated that it is easily attached to old or new cars of any make.

WESTERN AUTOMOBILE MAPS.

Denver Company Is Publishing a Comprehensive Series Covering 15 States.

In anticipation of the increased interest in transcontinental touring, as the result of the Panama-Pacific exposition of 1915, the Clason Map Company, Denver, Col., is issuing a series of 15 handbooks for motorists, which will prove of decided value. The books are inexpensive and each contains information of one state, the 15 states treated being: Arizona, California, Colorado, Idaho, Kansas, Montana, Nevada, New Mexico, Nebraska, Oklahoma, Oregon, Texas, Utah, Washington and Wyoming.

In each book is a map, printed in colors, with the principal automobile routes in red. It also presents information concerning the cities and towns, the roads over which they may be reached, and useful data in preparing for the trip. It is believed by the officials of the company that the series will meet a long felt want on the part of those who are seeking reliable information concerning the various routes to and from the Pacific Coast, and those available for reaching places of unusual interest.

Fuel economy is to be emphasized in the Chicago-Boston non-stop run, for the Glidden and other trophies, through the offering of a cup by P. C. Crenshaw, general manager of the Standard Oil Company of Indiana, for the most economical car in the use of gasoline.

W. A. Frise of Detroit has taken the Michigan distribution of Tuthill vehicle springs, made by the Tuthill Spring Company of Chicago.

GENERAL NEWS OF THE INDUSTRY.

Ford Motor Company Grants Men Leave of Absence for 30 Days and Advises Them to Seek Employment Elsewhere--New Concerns, New Buildings, Etc.

THE Ford Motor Company, Detroit, has posted the following bulletin throughout the factory:

In the regular course of business we have reached the quiet season. In line with our policy to be just and fair to the individual employee, we have planned as follows: Employees will be given a leave of absence, without pay, or, if you please, laid off for a period of 30 days. If, during the leave of absence or "laid off" period, the employee can find other employment, the company recommends that he do so. If at the end of 30 days our men have found no other employment and desire to return to work, they may apply and the company will endeavor to find employment for them.

It is explained by James Couzens, vice president of the company, that men will be laid off in rotation if necessary, single men first and married men only after being held as long as possible. It will be remembered that the Ford company recently established a profit sharing plan, under which the wages of employees were doubled, and a number of new employees were added. Concerning this phase of the situation, Mr. Couzens is quoted as follows:

When we established the profit sharing plan we knew that we could not employ all the men all the year round, but we thought we were giving them sufficiently high pay, so that they could afford to lay off a month in the summer time. I cannot say at present what is the total number of men we shall lay off. It may average 1000 a week for the next six weeks. There is nothing unusual about this lay off, as it always occurs at this the slack season of the year.

It may be added that the Ford Motor Company has just declared an extra cash dividend of 100 per cent., or \$2,000,000. This took place on the 11th anniversary of the organization of the company, and it is stated that Henry Ford, with 56.5 per cent. of the 20,000 shares of common stock, received \$1,170,000, and James Couzens with 10.9 per cent. got \$218,000. Other large shareholders and the amounts they are said to have received are: John F. Dodge, Horace E. Dodge, Horace H. Rackham and John W. Anderson, \$100,000 each; David Gray estate, \$210,000; R. V. Couzens, \$2000.

NEW SIX-CYLINDER CAR.

Gary Automobile Manufacturing Company Organized for That Purpose in Gary, Ind.

The Gary Automobile Manufacturing Company, Gary, Ind., has been incorporated for about

\$250,000, to produce six-cylinder touring cars and speedsters. Dr. G. Pass is president of the concern, and others interested in it are C. J. Flannigan and D. C. Throckmorton. E. T. Birdsall, chairman of the Detroit section, Society of Automobile Engineers, is said to have been retained as consulting engineer and purchasing agent.

A factory has been established and plans have been laid for the production of about 100 machines the first year. The motor is to have bore of 3.75 inches and stroke of 5.5. Wire wheels, streamline body, 130-inch wheelbase, Timken axles and Westinghouse lighting and starting system are among the features.

KNOX MOTORS COMPANY.

Capitalized for \$2,500,000 to Take Over Business of Knox Automobile Company.

Following the announcement of the sale of the assets of the Knox Automobile Company, Springfield, Mass., to E. O. Sutton, as made in the last issue of The Automobile Journal, comes the information that the Knox Motors Company of that city has been incorporated with capital of \$2,500,000 to take over this business. The officers of the new concern are: President, Harry G. Fisk; treasurer, E. O. Sutton; clerk, C. H. Beckwith.

The capital stock is divided into \$1,250,000 preferred and \$1,250,000 common. The company will continue the production of Knox pleasure cars, trucks and fire apparatus, and Knox-Martin tractors for general haulage and fire apparatus work.

ERECTING NEW BUILDING.

Work Begins on New Plant of Pittsburg Model Engine Company in That City.

Contracts have been let and ground has been broken for the erection of the new Pittsburg plant of the Pittsburg Model Engine Company, a reorganization of the Model Engine Company of Peru, Ind. The concern owns four acres on the main line of the Pennsylvania railroad at Homewood station, 12 minutes from the heart of the city. The land, proposed buildings and

equipment will cost more than \$500,000. The main structure will be 247 by 235 feet, the power plant 67 by 67, and the office building 50 by 80, all of fireproof construction, steel, brick and glass.

The company will continue to operate its Peru plant until further notice, and in addition to the manufacture of the poppet valve engine for automobiles and tractors, it will specialize in its new plant, in the production of the Carter piston valve motor, which it owns and controls. It is stated that the decision of this concern to locate in Pittsburg was brought about very largely through the efforts of the Pittsburg Industrial Development Commission, which has induced 24 industries to locate in that city during the past two years.

JACKSON'S PRESIDENT DEAD.

George A. Matthews Dies Suddenly While at His Office in Jackson, Mich.

George A. Matthews, president and general manager of the Jackson Automobile Company, Jackson, Mich., died very suddenly May 13, while working at his desk in the office of the company. He is survived by two sons, Howard and George A., Jr., who are actively identified with the business of that concern.

Mr. Matthews had long been identified with the industry and with other interests in Jackson. He organized the Jackson Automobile Company in 1900, becoming secretary and treasurer. Previous to this he was connected with the Fuller Buggy Company and the American Wheel Company, his work with these companies also being of value to the automobile industry. At the time of his death he was a director in one of the Jackson banks, and always had the welfare of the city and its various industries at heart.

SELLS SPRING BUSINESS.

Alloy Steel Spring Company Organized to Handle It in Jackson, Mich.

The Lewis Spring & Axle Company, Jackson, Mich., has disposed of that portion of its business devoted to the manufacture of springs, to a company styled the Alloy Steel Spring Company, of which the following are officers: President, Fred Keiser, vice president of the Lewis company; vice president, Casper Haehnie; secretary and treasurer, A. L. Wuster.

Under the terms of the sale the Lewis inter-

ests acquire the E. C. Clark Motor Company of Jackson, of which Mr. Lewis is treasurer. Except that springs will hereafter be made by the Alloy Steel Spring Company, which has purchased a plant for that purpose from the Lewis company, the latter concern will continue its business as in the past.

BECOMES SALES MANAGER.

William T. Helfer Assumes That Position with the Jeffery-Dewitt Company.

The many friends of William T. Helfer, throughout the automobile industry, will be glad to learn that he has accepted the position of sales manager of the Jeffery-Dewitt Company, Detroit, Mich., maker of spark plugs. He was for a number of years sales manager of the Springfield Metal Body Company, Springfield, Mass., and left that concern in May, 1910, to go with the Racine Manufacturing Company, Racine, Wis. His past experience and his wide acquaintance should prove of decided value in his new position.



William T. Helfer, Sales Manager, Jeffery-Dewitt Company.

The Jeffery-Dewitt Company has recently added several new buildings, including a three-story structure used exclusively for the manufacture of porcelain insulators, with a production capacity of 20,000,000 porcelains a year, and a kiln with capacity of 120,000 porcelains.

REORGANIZE AMPLEX COMPANY.

Mishawaka Concern Capitalized for \$200,000 to Produce Medium Priced Car.

A charter has been issued by the secretary of state in Indiana for the Amplex Manufacturing Company, Mishawaka, which has been incorporated with an authorized capitalization of \$200,000. The directors and principal stockholders

are Harold M. Pulsifer, E. J. Gulick and R. W. Randall, who some weeks ago purchased the assets of the Amplex Motor Car Company, in that city.

The Amplex Motor Car Company was formerly the Simplex Motor Car Company, and built the Amplex car for some years. It recently went into the hands of a receiver and the assets were purchased as stated above. At the time of the sale it was announced that the purchasers intended to produce a medium priced car.

FILES FINANCIAL STATEMENT.

Hood Rubber Company Makes Public Its Condition at Close of Fiscal Year.

The Hood Rubber Company, Watertown, Mass., has filed with the secretary of state for Massachusetts a statement of its financial condition at the close of its fiscal year, which shows the following comparisons for 1912 and 1913:

Assets.		1913	1912
Real estate	\$1,408,756	\$1,343,893	
Machinery	322,897	315,005	
Furniture and equipment.....	468,345	441,100	
Material, stock in process.....	1,146,923	1,015,867	
Cash and debts receivable.....	2,533,258	1,951,410	
Patent rights	1,000	1,000	
Investments	392,296	458,253	
Total	\$6,273,478	\$5,526,530	
Liabilities.			
Capital stock	\$2,600,000	\$2,500,000	
Capital stock subscriptions.....	400,000		
Floating debt	1,190,000	965,000	
Surplus	2,083,478	2,061,530	
Total	\$6,273,478	\$5,526,530	

ADDITION TO PLANT.

Four Wheel Drive Auto Company Is Erecting New Structure in Clintonville, Wis.

The Four Wheel Drive Auto Company, Clintonville, Wis., has begun work on another addition to its plant, which will be known as unit No. 6, consisting of a building 40 by 80 feet, to be used as a paint shop. This will give the concern a complete plant in every detail, and it will have approximately 46,000 square feet of ground covered with solid brick buildings, or over one acre under roof.

Since the company moved into its first building in August, 1911, the factory has been running continuously every day. During the past year it was working 10 hours a day. Orders for trucks have been increasing steadily and it is stated by the officials that the entire plant will

be taxed to its utmost capacity in trying to keep up with the demand.

NEW TRUCK COMPANY.

Reedsburg Motor Truck Company Formed to Resume Production of Piggins Line.

The Reedsburg Motor Truck Company, Reedsburg, Wis., has been incorporated with capital of \$100,000, for the purpose of engaging in the manufacture of a line of motor trucks formerly produced by the Piggins Manufacturing Company of Racine. Among the incorporators are E. E. Montgomery, Edward Thom, J. Seamans and E. M. McNab.

Mr. McNab formerly was designer for the Piggins company. It is not understood that the line will be continued under that name, but will be known as the Reedsburg.

SHOCK ABSORBER PATENT.

Judge Sanborn Gives Maker of Velvet Decision Over Producer of J-M Design.

A decision of much interest to the automobile industry is that handed down recently by Judge Sanborn of the United States district court, sitting in Chicago, in the action brought by the John W. Blackledge Manufacturing Company of Chicago against the J-M Shock Absorber Company of Philadelphia, alleging infringement of patent rights and asking that the defendant company vacate. The former concern makes the Velvet shock absorber and the latter the J-M.

The suit involves a situation which is somewhat unusual, in that the Velvet shock absorber is made under letters patent No. 988,229, issued to Charles A. Tilt, March 28, 1911, while the J-M is produced under letters patent No. 1,015,682, issued to L. P. Jaquet, Jan. 23, 1912. Both Tilt and Jaquet claim to have solved the problem of eliminating sidesway and preventing excessive shock being transmitted to the car and passengers.

Judge Sanborn holds: "The J-M shock absorber has the same elements as the Velvet but is different in details. It has everything found in the Velvet, as well as many other good things". The decision was for the plaintiff.

S. E. Hibben, Chicago attorney for the J-M company, is quoted as stating that an appeal would be made by the New York attorney. The Blackledge company will ask for a decree granting a preliminary injunction restraining further manufacture and sale of the defendant's product.

JOINS HAYNES SALES FORCE.**C. J. Corkhill Becomes District Sales Manager in Southwestern Territory.**

The Haynes Automobile Company, Kokomo, Ind., has appointed C. J. Corkhill, district sales manager for the states of Nebraska, Missouri, Oklahoma, Kansas and Arkansas. He will divide his time between headquarters established in Omaha and Kansas City.

Mr. Corkhill has been identified with the automobile industry for a number of years, and is particularly well fitted for his new duties from his knowledge of conditions in the southwest and his wide acquaintance among the trade in that territory. Salesrooms have been opened in the two cities named and service departments, in charge of competent mechanics, will be maintained for the benefit of Haynes owners.

EMPLOYEES BUYING STOCK.**United States Rubber Company Making It Possible to Yield Good Returns.**

In financial circles it is stated that the United States Rubber Company, of which the United States Tire Company, New York City, is a constituent, is making it possible for its employees to purchase common stock on a partial payment plan at \$60 a share. This price is understood to compare with \$65 in 1913 and \$45 in 1912.

Last year, a total of 5.5 per cent. was paid in cash dividends, and four per cent. in 1912. A 20 per cent. extra stock dividend also was paid in 1912. For 1914 it is understood that the subscribing employees will receive the regular six per cent. dividend, and, in addition, an extra cash bonus of three per cent. a share. At the above price, \$60 a share, this disbursement yields the employees 15 per cent. on their money.

KLAXON AND LONG HORNS.**Lovell-McConnell and G. Piel Company Come to an Agreement as to Production.**

Announcement is made of an agreement between the Lovell-McConnell Manufacturing Company, Newark, N. J., maker of Klaxon horns, and the G. Piel Company, Long Island City, N. Y., maker of Long horns, whereby each concern is to continue the production of its present types of hand operated signals under their several patents. In addition, the latter company is to

develop and place in the market a line of motor driven electric horns of similar construction to the hand operated product of that concern.

In connection with this announcement comes the information that the litigation in which these concerns have been involved for some time has been discontinued. The H. W. Johns-Manville Company will continue to market all the horns manufactured by the G. Piel Company.

NASH SUCCEEDS DANIELS.**Head of General Motors Company Will Direct Management of Oakland Concern.**

Following the announcement that George E. Daniels, for the past four years vice president and general manager of the Oakland Motor Car Company, Pontiac, Mich., had resigned, comes the information that Charles W. Nash, president of the General Motors Company, of which the Oakland concern is a constituent, has assumed the duties of these offices, in addition to those already attaching to the office of president.



Charles W. Nash, President, General Motors Company.

Mr. Nash entered the industry when the Flint Road Cart Company, Flint, Mich., became the Durant-Dort Carriage Company, in which concern he arose from a position in the trimming department to superintendent, vice president and director. In the fall of 1910 he became general manager of the Buick Motor Company of Flint, a position in which he exhibited splendid executive ability. He became president of the General Motors Company in November, 1912.

In connection with the above announcement it is of interest to note that Oakland sales for April, 1914, showed an increase of 47 per cent. over those for April, 1913. It was the largest single month's business in the history of the company.

BUYS COLUMBUS BUGGY PLANT.

Understood That It Will Be Combined with That of E. R. Thomas Motor Car Company.

According to a dispatch from Columbus, O., the plant and business of the New Columbus Buggy Company in that city has been sold to Charles A. Finnegan and Eugene D. Hofeller, both of Buffalo, N. Y. Mr. Finnegan purchased the assets of the E. R. Thomas Motor Car Company in Buffalo, and it is understood that the new plan involves the removal of what remains of the Thomas business to Columbus, there to be incorporated with the production of cars heretofore conducted by the Columbus Buggy Company and its successors.

The Columbus Buggy Company was organized some 42 years ago, and produced carriages and phaetons, previous to the inception of the automobile industry. C. D. Firestone, its head, early began to experiment with motor vehicles, and for a number of years the concern manufactured the Firestone-Columbus gasoline car and the Columbus electric machine.

Jan. 25, 1913, the company went into the hands of a receiver, and June 7 the assets were sold to a creditors' committee. Jan. 23, 1914, the creditors organized the New Columbus Buggy Company, with the following officers: President, George W. Lattimer; treasurer, George W. Bright, and secretary, D. N. Postlewaite. E. R. Sharp and B. G. Watson also were on the board of directors. This is the concern which is said to have made the sale to the Buffalo men.

CAMERON COMPANY'S FAILURE.

Schedule Shows Liabilities Totalling \$121,998.38 and Assets of \$48,631.47.

The Cameron Manufacturing Company, New Haven, Conn., has filed a schedule in bankruptcy showing liabilities of \$121,998.38, including secured claims amounting to \$91,858.50 and unsecured claims totalling \$28,275.59, and assets of \$48,631.47, represented in real estate, amounts due on open accounts and \$8.30 cash in the bank. The real estate is subject to a mortgage to the Parmelee company and to Pierpont B. Foster, and the machinery, fixtures and tools to a \$40,000 mortgage. Included in the assets, also, are claims against a number of men who subscribed for stock and who have not paid up.

E. S. Cameron, designer of the Cameron car, built his first automobile in Brockton, Mass., in 1901. For a number of years Cameron air-cooled

cars were made by the Cameron Car Company in Beverly, Mass. The concern was reorganized as the Cameron Manufacturing Company about a year ago, and subsequently removed to the old Mathushek Piano Company's plant in West Haven, Conn. About the time of the reorganization a new water-cooled car was projected.

For some time past Mr. Cameron, as well as several men connected with the Cameron Manufacturing Company at the time of its removal to New Haven, including Frank S. Corlew, sales manager, have been interested in the formation of the Euclid Motor Car Company, with headquarters in New York City. The latter concern is to manufacture a cyclecar of the light car type, utilizing an air-cooled engine designed by Mr. Cameron.

AGAIN ANTICIPATES OBLIGATIONS.

General Motors Company Purchases Another \$2,000,000 of Its Five-Year Notes.

According to the Wall Street Journal, the General Motors Company, Detroit, has purchased, for the sinking fund, \$2,000,000 of its six per cent. first lien, five-year gold notes, in anticipation of its obligation to pay, Oct. 1, \$2,000,000 cash to the trustees for sinking fund purposes. This makes a total of \$7,099,000 in notes that have been purchased, leaving outstanding \$7,901,000 of the notes which will mature Oct. 1, 1915.

There were originally issued \$15,000,000 of these notes, the sinking fund requirements on which were as follows: Oct. 1, 1911, \$1,500,000; Oct. 1, 1912, \$1,500,000; Oct. 1, 1913, \$2,000,000; Oct. 1, 1914, \$2,000,000. Most, if not all, of these obligations have been anticipated by the company. The current fiscal year, which ends July 31, is proving very prosperous for the company, and the notes above stated were purchased through the Central Trust Company, trustee.

NEW LUBRICANT PRODUCER.

Continental Asbestos Company Begins Operations in Worcester, Mass.

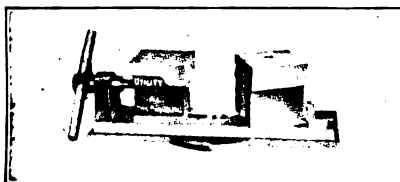
The Continental Asbestos Company has been organized in Worcester, Mass., with capital of \$200,000, but with privilege of increasing this later to \$1,100,000, for the production of lubricants. It is understood that the materials, before manufacture, come from Quebec. The company has begun operations in a factory at 7-11 Summer street.

NEW ACCESSORIES FOR THE MOTORIST.

JACKSON UTILITY VISE.

Designed Especially for Owner and Is Easily and Quickly Operated.

The Utility vise is manufactured by C. J. Jackson, M. E., Easton, Penn., and one of its qualities is its adapt-



ability for holding a variety of material in a number of different positions without the aid of clamps, bolts, etc.

Operation of the front jaw of the vise is by a steel screw and a bronze nut. The four-faced revolving rear jaw is in the form of a hollow cube, having one side left open to permit of using a wrench for actuating the locking screw nut. This construction permits of utilizing the jaws singly or in combination.

A type smaller than the standard size is manufactured, and is especially suited for the motorist who undertakes his own repairs. One of the features of the design is the rapidity with which the work may be clamped into position and removed.

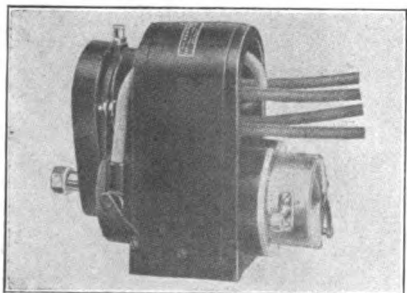
BERLING MAGNETO.

High-Tension, Dual, Water and Oil Proof Type for Cyclecars.

The Ericsson Manufacturing Company, 1119 Military road, Buffalo, N. Y., is producing the Berling magneto, a high-tension instrument of the dual type for two-cylinder V type cyclecar motors. The dual feature is obtained by a simple combination of the collector ring and distributor, and it is stated that gears and extra bearings are eliminated. The interrupter and timer are combined.

A transformer or dash coil is utilized for the battery current. The high-tension cables are so connected to the magneto that the possibility of short circuits is prevented, and a felt washer protects the driven end bearing from foreign elements.

The frame is a solid unit, and it is stated that there are no screws to



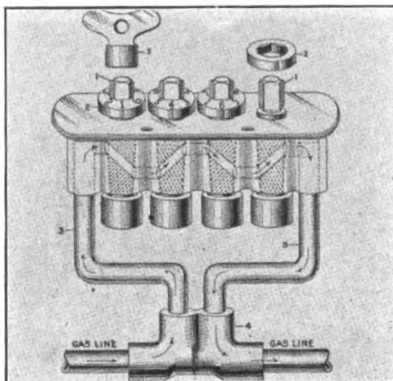
loosen, causing short circuits. It is also claimed that the instrument is oil and water proof. Extreme efficiency is emphasized in the design, it being stated that the magneto will give off a spark of .1875 inch at 75 revolutions a minute.

The air gap between the armature and the field is about .005 inch and the armature is carefully wound. The bearings employed are imported and the platinum contact points are ample in size. The insulating material is noted for its high dielectric strength, and the interrupter mechanism is very accessible, as are other components utilized in service.

SECURITY AUTO LOCK.

Controls Fuel Supply by Ingenious Use of Combination Valves.

One of the most practical and efficient methods of preventing use of the car by others than those intended is to lock the fuel supply. When the flow of fuel is cut off, the amount remaining in the carburetor will be sufficient to operate the machine but a very short distance, and even this



can be prevented by running the motor a little while after the fuel is locked.

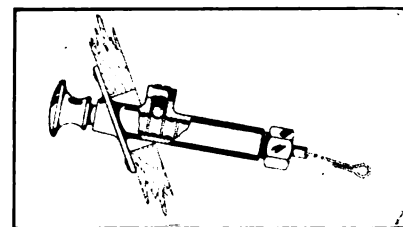
The Security Auto Lock Company, 1733 Broadway, New York City, is making the Security auto lock, which is an ingenious device for incorporation in the fuel line, convenient to the operator. It comprises four valve members in a row, each having a passage for the gasoline. The fuel enters and flows as indicated by the arrows in the illustration, but it can pass only when the valve mechanism is set in a certain position. The failure of one of the valves, of course, locks the device.

At the top of each valve is a numbered ring, and the passages are made to register by turning the plug members with a small wrench key until those forming the combination are properly set. One of the qualities of the invention is that the numbered rings can be removed and replaced, providing an endless number of combinations known only to the owner.

GEMCO DASH CONTROL.

Neat, Compact Device for Controlling the Carburetor Components.

The Garage Equipment Manufacturing Company, Milwaukee, Wis., maker of Gemco specialties, has



brought out a dash control for the carburetor. As will be noted by the accompanying illustration the device is inserted through the dash at a convenient angle, and is provided with a neat handle.

The construction is such that either a wire or a rod may be utilized for connecting the operating handle with the carburetor, and by an ingenious ball and socket arrangement various degrees of adjustment or opening can be obtained.

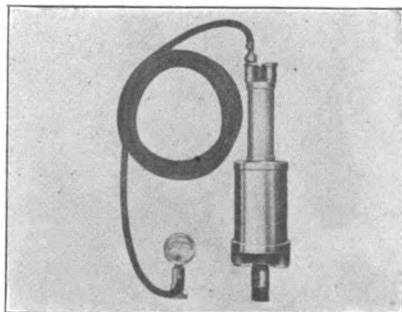
The control is adaptable for priming or flushing the carburetor, closing the butterfly air valve to enrich the mixture when starting etc. There are several practical purposes for which the control member could be utilized.

HANS POWER TIRE PUMP.

Is Inserted in Spark Plug Opening and Equipment Is Complete.

The Hans Motor Equipment Company, La Crosse, Wis., has brought out an automatic tire pump, which comes complete with gauge and 12 feet of high grade flexible hose. It is the spark plug type; that is, it is provided with a threaded end for insertion in the spark plug opening.

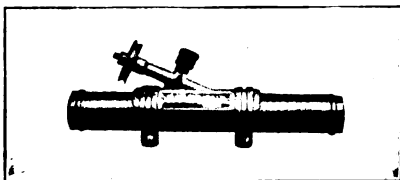
The pump is constructed of brass, has two independent checks in the secondary pump, and the bottom inlet is double. Nothing but pure air is forced to the tire, and one of the qualities of the design emphasized is that it will not overheat in service. The gauge supplied is known as the standard No. 3. The material and workmanship are strictly first class.



KERN WATER CIRCULATOR.

Assists Cooling System of Ford Motor, Improving Efficiency.

The Pittsburg Manufacturing Company, Ltd., 703 East End Trust building, Pittsburg, Penn., is marketing



the Kern water circulator for model T Ford motors. It is designed to augment the flow of the cooling fluid, and comprises a simple propeller incorporated in the lower pipe shown in the accompanying illustration.

The propeller is actuated by a pulley driven by belt, and the water is circulated in proportion to the motor speeds. It is estimated that the device will circulate eight gallons at 500 revolutions a minute and 18 gallons at 1100. The maker states that it does not interfere in any way with the thermo-syphon cooling system of the motor, and that it will keep the water at a temperature making for the greatest efficiency. The design is easily attached and is accompanied by a liberal guarantee.

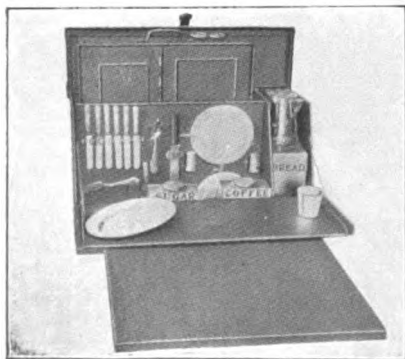
PRENTISS KITCHENETTE.

Includes Stove, Full Set of Dishes, Cooking Utensils, Etc.

The Prentiss Manufacturing Company, Racine, Wis., is making a specialty of cooking outfits for tourists, and the steel kitchenettes, as they are termed, are very compact and may be carried on the running board of the car. That illustrated is the No. 1 or six-party outfit.

It contains a full set of dishes for six persons with the necessary knives, forks and spoons, and, in addition, containers for coffee, sugar, salt and pepper. There are also frying and baking pans and other cooking utensils. The dishes are made of the best white enamelled ware.

The case is made of No. 22 gauge auto steel, nicely finished in black, and adjustable leg supports are fitted to the outer leaf of the table. All openings are felt lined to exclude dust and foreign elements. The case



measures 28 inches long, 17.5 high and 12 wide. The weight is 75 pounds.

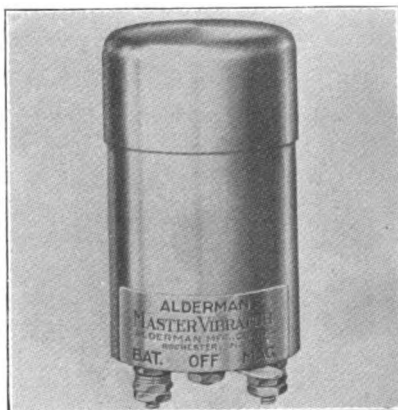
The folding stove utilized with the equipment employs gasoline as fuel and has three burners, two of which are for cooking and the other for the oven. The last named folds out of the way when not in use.

ALDERMAN MASTER VIBRATOR.

A Compact Unit Providing Battery and Magneto Control.

The Alderman Manufacturing Company, Inc., Rochester, N. Y., has brought out a new master vibrator intended for service with the model T Ford motor. The Alderman design is very compact, cylindrical in form, and the switch arrangement incorporated with the vibrator provides for control of the battery and magneto currents, as well as the usual "Off" position. The switch lever is very neat, and the terminals are not only sturdy, but well designed.

The special feature of the design is the condenser, the company stating that it absolutely prevents burning



of the platinum contact points and that these members will not require attention. The advantages of a master vibrator with multiple-unit coils is well understood. Synchronization of the spark is obtained, and when batteries are utilized it makes for economy of current. The Alderman is moderately priced, is finished in black enamel, and can be supplied in brass or nickel if desired. It is sold under a 30-day trial.

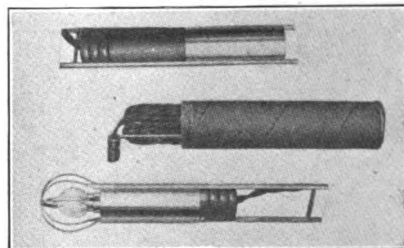
The editor of this department wishes to acknowledge the receipt of several communications from manufacturers requesting that their product be mentioned. As the articles have been described and illustrated within the year in these columns, it is deemed advisable not to discuss their merits again. The data submitted, however, are filed for reference, and for the benefit of readers of The Automobile Journal who may make inquiries for such devices.

Several accessory manufacturers have forwarded descriptive matter of new accessories without illustrations. As previously stated, suitable illustrations should accompany the data. This will insure publication and in the order received.

CUNO INSPECTION LAMP.

A Novel Tube Design Having Reel for Winding up Cord.

The Cuno inspection lamp is marketed by the Cuno Engineering Corporation, 80 South Vine street, Meriden, Conn.



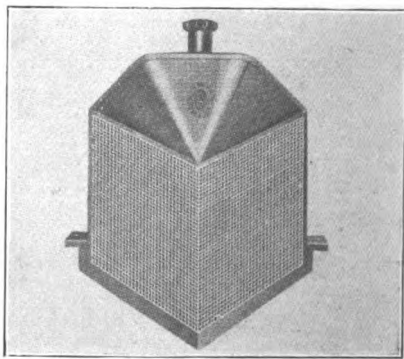
It has a black enamelled wooden handle with a special type of Ediswan socket, and the 10-foot extension cord is attached to a hard rubber plug connector. The bulb is protected from damage by a bronze spring guard projecting from the socket mounting. When not in service the bulb is protected by a brass tube which slides over it and the guard.

This provides a light for general purposes or concentrated rays, according to the position of the tube. The cord is wound up on a reel, a brass frame attached to the tube serving to accomplish this operation. One end of the reel frame provides a hook for suspending the light when in service. All metal parts are nickel-plated and polished, and the dimensions of the light are 1.5 inches diameter and 7.75 length.

LIVINGSTON RADIATOR.

V Type, Honeycomb Design for Model T Ford Cars.

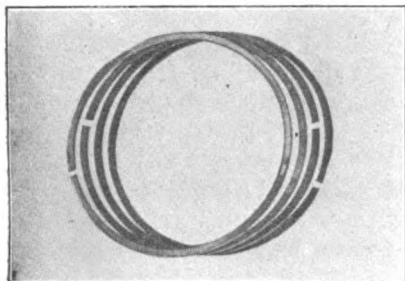
The Livingston Radiator & Manufacturing Company, 146 West 52nd street, New York City, is marketing a V type radiator for the model T Ford car. It is of the honeycomb design, constructed with bronze tubes, and the water channels are sufficiently large to flush out foreign deposits easily. Small corrugations, which are formed in the sides of the tubes, are designed to give additional strength, to increase the radiating surface and to allow for expansion. The radiator holds 4.5 gallons of water, is finished in polished brass or German silver and a new starting crank is included.



PERFECTION PISTON RING.

Is Constructed in Four Separate Sections and Is Very Light.

The Automobile Construction Engineering Company, 3324 Ludlow street, Philadelphia, is marketing the



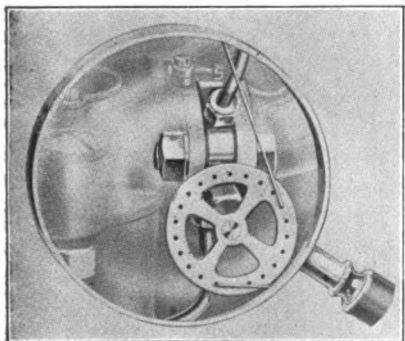
Perfection piston ring, which differs from conventional design in that each ring is made up of four separate members, all of which fit the single piston ring groove. It is claimed that they are lighter in weight than ordinary members, and that they cannot be broken when fitting as the piston can be entered into the cylinder without compressing them. An even tension and leak proof qualities are also claimed. Better lubrication is held to be obtained with the Perfection than with ordinary types.

ALDERMAN PRIMER.

Operates from Seat and Combines Fuel Mixing Device.

The Alderman primer and power magnifier is produced by the Alderman Manufacturing Company, Rochester, N. Y., and, as the name implies, combines a priming and mixing device. The primer is constructed to be operated either from the seat or in front of the car and includes, in addition to the actuating means, a tube placed inside of the intake manifold. The fuel is led to this tube by a special connection, and when the piston descends on the suction stroke, the gasoline is sprayed, forming a rich mixture. Condensation is held to be eliminated. It is stated that the device can be fitted without drilling, etc.

The magnifier mixes superheated air in the proper proportion with the vapor from the carburetor, the heat of the exhaust being utilized and being carried through a special tube to



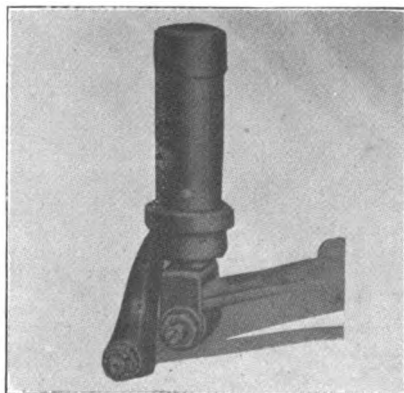
the power magnifier. The control unit is mounted on the dash and is provided with a lever, enabling the driver to cut down or increase the air supply according to conditions. When a motor starter is utilized a press button is included.

The fitting of the combined primer and power magnifier does not require any alterations, other than incorporating a union in the fuel line, and this member, as well as all necessary bolts, gaskets, screws, etc., is supplied with each outfit. The company is making a special design for Ford cars.

E. Z. SHOCK ABSORBERS.

Employ Coiled Spring and Are Constructed for Ford Cars.

The Forest City Electric Company, 5006 Windsor avenue, Cleveland, O., is marketing the E. Z. Rider shock absorbers, which are especially designed for the model T Ford automobile. They come in sets of four, two for the front and two for the rear springs, and the principle involved is the use of a sensitive coil spring. One of the features of the construction is that they are inter-



changeable with the spring brackets, and can be easily and quickly installed.

It is stated that the springs absorb all jars, bumps and vibrations caused by rough roads, contributing to the comfort of the passengers, as well as making for tire economy. The complete set with all fittings, etc., weighs 18 pounds.

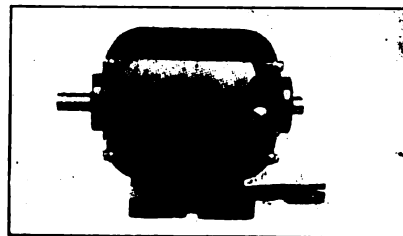
PORTABLE VULCANIZERS.

Among the practical, standard accessories is the portable type of vulcanizer, by means of which the motorist may accomplish repairs to tubes and casings at a minimum of expense. These vulcanizers are not only moderately priced, but they have been so perfected that they may be successfully operated by the most inexperienced. Being very compact, and generally utilizing gasoline as a fuel, they may be carried in the tool box, permitting of making roadside repairs in less time than is required by the usual patching method. Generally the vulcanizer comes complete; that is, with rubber, cement, shears, fabric, etc. Detailed instructions are also supplied.

WARD LEONARD DYNAMO.

New Generator for Cyclecars Having Six-Ampere Output.

The Ward Leonard Electric Company, Bronxville, N. Y., maker of electric lighting and starting sys-



tems, has brought out a generator especially adapted for service on cyclecars. Dynamos, such as utilized on automobiles, are not adapted to the cyclecar motor, as the lamp load of a little car is approximately five amperes.

The output of the new Ward Leonard design is about six amperes at 1800 revolutions a minute, and it is a very compact generator, one having the same high grade material and workmanship for which the products of this concern are noted. The method of controlling the output of the new machine is the same as that used with standard types made by this company.

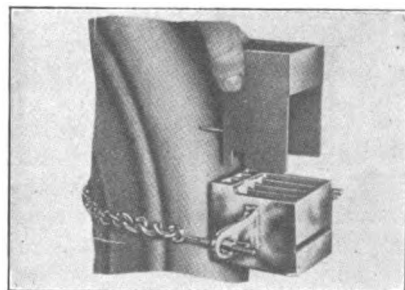
POSITIVE VULCANIZER.

Utilizes Heat from Steam and Is of the Portable Type.

Among the more recent types of portable vulcanizers designed particularly for the small garage and motorist is that manufactured by the Positive Supply Company, Davenport, Ia. In designing the vulcanizer the company had in mind the owner who is not familiar with vulcanizing and who wishes to perform repairs to casings and tubes.

It is stated that the Positive will not burn or overcure when employed by inexperienced persons, as the gasoline or fuel chamber is separated from the tube or casing by a water compartment.

It has a face measurement of three by four inches, weighs three pounds, and is so constructed that it may be securely mounted on the work bench, insuring accurate repairs to tubes. To vulcanize, the rubber is placed on the tube, the vulcanizer filled with fuel and water and the gasoline lighted.



ACTIVITIES OF THE CYCLECAR INDUSTRY.

Memorial Day to Mark the Opening of the Contest Season—National Association Assumes Control of Such Work—Latest Models Announced by Manufacturers.

MEMORIAL Day will mark the official opening of the first cyclecar season, at least, insofar as the contest situation is concerned, several of the clubs throughout the country having arranged for runs on that day. The New England body will occupy two days in covering most of central Massachusetts, the Detroit and Chicago clubs will travel overland to the 500-mile race in Indianapolis, the New York club will run to Cape May, N. J., and the New Jersey organization will spend the day at President Percival's farm in Teaneck, where an interesting programme of sports has been arranged.

While hundreds of cyclecars have now been shipped from the factories, most of these are still in the hands of dealers, for the reason that prac-

others may be developed by the performance of cars in the hands of users. The results of the Memorial Day events will be awaited with interest.

PLANS ARE CHANGED.

Revised Itinerary Shows New England Club Run Will Be Confined to Massachusetts.

Although it was originally announced that the first run of the Cyclecar Club of New England, May 30-31, would enter three states, Massachusetts, Connecticut and Rhode Island, it has been decided to change the itinerary so that it will be confined to the first named commonwealth. The following detailed itinerary has been made public by E. P. Blake, Boston, president of the club:

Saturday, May 30—Leave Hotel Oxford, Huntington avenue, Boston, at 8 sharp; to South Framingham, Framingham, Marlboro and Worcester; due in Worcester at 12:15 for luncheon; to Spencer, Warren, Palmer and Springfield; due in Springfield at 5:30; banquet and cyclecar show in Hotel Kimball.

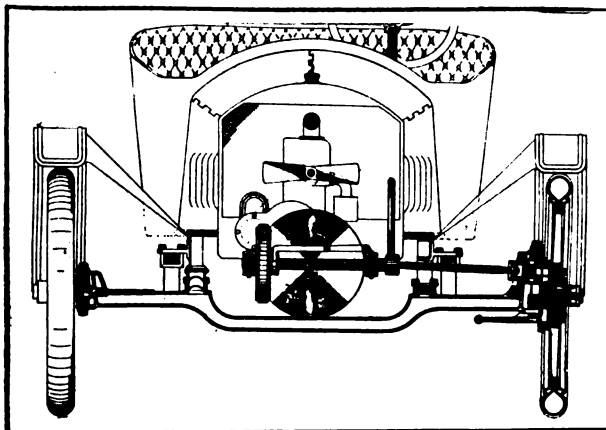
Sunday, May 31—Leave Springfield at 8; due in Chicopee at 8:25; to Holyoke and Easthampton, due 8:50; to Northampton and South Deerfield, due 9:20; Deerfield, 10:30; Greenfield, 11:30; one hour for lunch at Hotel Weldon or Mansion house; to Millers Falls, Athol, Templeton and Gardiner, due 2; Fitchburg, 3; Leominster, 3:30; Lancaster, 3:45; Clinton, 4:45; South Framingham, 5:05; Wellesley, 5:30; Needham, 5:45; Dedham, 6; Hyde Park, 6:15; Boston, 7.

DRIVES ONE FRONT WHEEL.

Designer of Rex Small Car Presents New and Novel Features of Construction.

"When is a cyclecar not a cyclecar?" asks the Rex Motor Company, Ford, Mich. "When it is an automobile", is the answer given by this same concern. However, the Cyclecar Manufacturers' National Association says that a cyclecar that has a motor with piston displacement of 106.9 cubic inches is a small car. The Rex Motor Company appears to have no quarrel with the C. M. N. A., and is quite content to have its product listed either as a cyclecar or an automobile as best meets the fancy of the purchaser.

The Rex is a two-passenger roadster model, with wheelbase of 100 inches and tread of 56, weighing 700 pounds complete with top and



Detailed Construction of Rex Left Front Wheel Drive.

tically no concern is as yet in a position to produce machines in sufficient numbers to supply the necessary demonstrators. It is expected that this is a condition which will be remedied very shortly, and the demand for cyclecars has been so insistent and so general that there is every reason for believing that the interest in these little machines will increase rather than diminish as it becomes possible to gratify the desire for possession.

Designers and engineers have the benefit of the experience gained by the automobile industry, but the history of the larger car is such as to warrant the suggestion that certain changes may be demonstrated as desirable as the result of racing and other contest work, and that still

windshield. The motor is a four-cylinder, water-cooled unit, cast en bloc, with bore of 2.75 inches and stroke of 4.5, being rated by the maker at 16 horsepower. Ignition is by the Stevens system.

But the chief feature of interest in connection with the Rex is the method of transmitting power from the motor to the left front wheel. The transmission consists of a single leather fibre disc fastened directly to the driving shaft, which moves across the face of the flywheel. This shaft has two universal joints, and a pinion on the outer end is on a short stub, the inner end of which is mounted on a large universal joint, the axis of which coincides with the axis of the steering knuckle pin.

An internal gear, which with the pinion affords a very considerable reduction, is mounted in a housing bolted to the hub of the wheel. The inner side of the housing is closed by a plate which does not rotate, being part of the knuckle, and has a flange extending over the periphery of the gear housing provided with felt packing to exclude dust. Ball bearings carry the main universal joint, and the wheels also are on ball bearings, all of which are of the adjustable type.

Except when the wheels are turned for steering, the main universal joint has no work to do, as the shaft is, of course, straight. The outer section of the main driving shaft is set at a slight angle so as to be perpendicular to the plane of the wheel, which is slightly cambered.

The front springs are semi-elliptic and the rear, cantilever. The front axle is of I beam section, with a drop in the centre, and the rear axle is of tubular construction, full floating. The wheels are of wood, carrying 28 by three-inch tires. The driver is at the left, and the motor is started mechanically from the seat. The equipment includes a top, windshield, lamps, tools, etc.

ISSUES A PROCLAMATION.

Cyclecar Association of America Formally Assumes Charge of Contest Matters.

It would appear that the matter of controlling cyclecar contests had been definitely decided, insofar as the Cyclecar Association of America is concerned. Ever since the appearance of the lit-

tle machines the question has been open to discussion, both the American Automobile Association and the Federation of American Motorcyclists having offered to assume charge of this matter. The president of the C. A. A. has made public the following proclamation, which is self-explanatory:

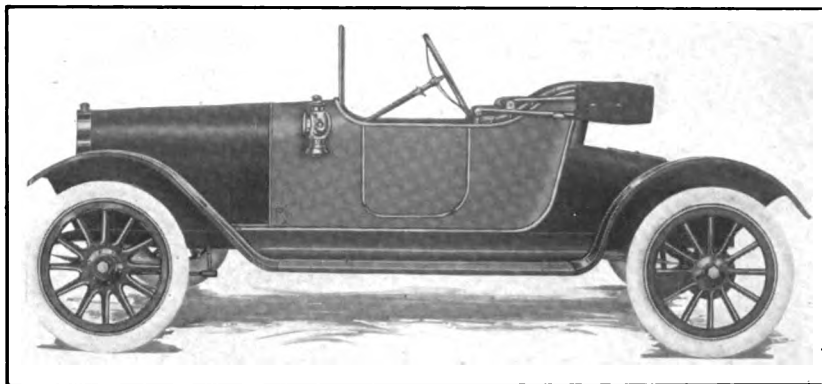
CYCLECAR ASSOCIATION OF AMERICA.

PROCLAMATION.

Whereas, the cyclecar interests of the United States, represented by four-fifths of the manufacturers and by a large number of cyclecar clubs, have deemed the cyclecar movement of sufficient importance, individuality and strength to control their own destiny; and,

Whereas, the Cyclecar Association of America has been formed by duly accredited representatives of said cyclecar clubs, for the purpose of assuming and carrying on the control of cyclecar contests and of otherwise promoting all that is for the good of cyclecar interests; and,

Whereas, the following pledge of support of said association has been voluntarily signed by 41 manufacturers of cyclecars:



Rex Model Is Distinctive Because of Its Single Front Wheel Drive.

Believing the cyclecar movement of sufficient strength and individual importance to be independent, and capable of serving its own best interests, the undersigned hereby pledge their (or his) support to the Cyclecar Association of America in all matters pertaining to the government of cyclecar racing and contests, with the understanding that the Cyclecar Association of America shall recognize the Cyclecar Manufacturers' National Association in the formation of rules and shall endeavor to complete working affiliations with other sport governing bodies.

Whereas, the following manufacturers of cyclecars have ascribed their signatures to said pledge, in writing:

(Here follows the names of the makers of the Grant, Liberty, Coey, Jr., Comet, Ceco, Duryea, Cricket, Dayton, DeCross, Detroit, Downing-Detroit, Dudley Bug, Euclid, Flagler, Frazier, Frederickson, Gadabout, Greyhound, Hawkins, Economycar, Malcolm-Jones, Keller Kar, Los Angeles, LaVigne, Roble, Milwaukee, Morse, National, O-We-Go, Pet, Puritan, Rex, Twombly, Saginaw, Ward, White, Whitmore, Zip and Woods Mobilette.)

Whereas, the organization of the Cyclecar Association of America has been completed and is in full working order, now,

Therefore, I, Charles P. Root, president of the Cyclecar Association of America, by authority vested in me by said association at a meeting held in Chicago in the month of February, 1914, hereby declare the Cyclecar Association of America the governing body in all matters pertaining to cyclecar contests of any nature and kind within the United States of America; and I further

declare that all promoters of cyclecar contests and all entrants of such contests shall apply to said association for authority or sanction to hold or compete in such contests or suffer such penalty as said association, through its contest committee, shall inflict; and, further, I hereby name as chairman of said contest committee, for the period of said association's first fiscal year, Richard F. Kelsey of New York, and delegate him power to select his own associates, with the approval of the undersigned.

Given under my hand and seal this 15th day of April, 1914.

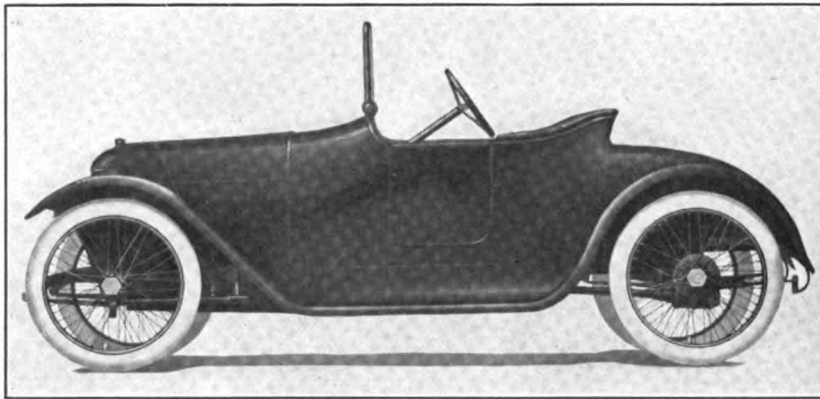
(Signed) CHAS. P. ROOT,
President, Cyclecar Association of America.

Attest:
(Signed) F. ED. SPOONER,
Secretary, Cyclecar Association of America.

PERCIVAL IS CHAIRMAN.

Well Known Transcontinental Motorist and Pathfinder Heads Touring Committee.

Charles P. Root of Chicago, president of the Cyclecar Association of America, has announced



New LaVigne Model, Which Places the Product in the Light Car Division.

the appointment of Dr. Charles G. Percival of Teaneck, N. J., president of the Cyclecar Club of New Jersey, as chairman of the national touring committee, with power to choose his associates from the various cyclecar clubs in the United States comprising the national body.

Dr. Percival is peculiarly well fitted for his new position, having crossed the continent eight times by automobile and having made one journey entirely around the border of the United States and from the city of Monterey, Mexico, to Carmack, Yukon Territory, north of 64 degrees in the Arctic Circle. He also is well known as a pathfinder, having first routed the Pacific highway, from Tia Juana, Mexico, to Vancouver, B. C., and the Old Trails route across the continent.

The Cyclecar Club of New Jersey seems particularly fortunate in securing national committee chairmanships, R. F. Kelsey, chairman of the

contest committee, being a member of that organization and a resident of Montclair, N. J.

NEW LAVIGNE MODEL.

Large Water-Cooled Motor Places the Machine in the Light Car Division.

The LaVigne Motor Company, Detroit, Mich., makes announcement of a new model LaVigne car, which takes the product of this concern out of the true cyclecar division and gives it a rating as a light car. This means that a new motor is being utilized and some of the other components have been changed as well. The wheelbase has been lengthened to 100 inches, from 96, and the tread is made standard, 56 inches, instead of 50. This necessitates a slight change in the outward appearance of the machine. The weight is 800 pounds. The two passengers are seated side by side, with the driver at the left.

The present motor is a water-cooled unit with bore of 2.75 inches and stroke of four, giving a piston displacement of 95.03 cubic inches, instead of the 69.8, with the old air-cooled motor of 2.375-inch bore and four-inch stroke. Ignition is by high-tension magneto, carburetion by a standard automatic float feed type instrument, cooling by thermo-syphon and lubrication by constant level splash, maintained by positive pump. The maker's rating of the new motor is 16-20 horsepower.

The multiple disc clutch, two-speed selective transmission and worm driven rear axle are retained. The springs are semi-elliptic in front, 32 inches, and three-quarter elliptic at the rear, 36 inches. The service brake operates on the rear wheels and the emergency on the propeller shaft. LaVigne demountable wire wheels are fitted, these carrying standard automobile 30 by three-inch tires.

The equipment is very complete, including two eight-inch electric headlights with dimmers, rear lamp with connector switch, ventilating windshield, top, envelope, curtains, spare wire wheel, mechanical starter operated from the seat, jack, tire pump and tool kit. As will be noted the new body is streamline in design, and the upholstery is in smooth, black leather. The gasoline tank is in the cowl of the dash.

ADOPTS CYCLECAR DELIVERY.

Maker of Leak-Proof Piston Rings One of the First Manufacturers to Do So.

That concerns closely allied with the automobile industry are satisfied that the cyclecar is a thoroughly practical vehicle is amply demonstrated by the accompanying illustration, which shows the machine utilized by the McQuay-Norris Manufacturing Company of St. Louis, Mo., maker of the well known Leak-Proof piston rings. Business men will be particularly interested in this installation.

The McQuay-Norris company found that the demand for its Leak-Proof rings from all the garages and repair shops, as well as directly from owners of automobiles and motor boats, was such that it was forced to take some action toward facilitating delivery of the orders. Parcel post proved far too slow to be of much assistance, and the local express service was found to be equally unsatisfactory.

After giving the cyclecar situation very careful consideration from every angle, this machine was purchased, and the city and suburban towns are now taken care of by it. Although the machine has been in commission only a short time, the company states that its usefulness has been demonstrated abundantly.

By this action the McQuay-Norris company becomes a pioneer in the use of the cyclecar for delivery service, and the neat, trim, little green car shown, with its uniformed driver, buzzing busily through the streets of St. Louis, or along the suburban highways, has occasioned much interest and comment. It will be noted, as well, that every advantage has been taken of the opportunity to make the machine pay from an advertising standpoint.

RECENT ANNOUNCEMENTS.

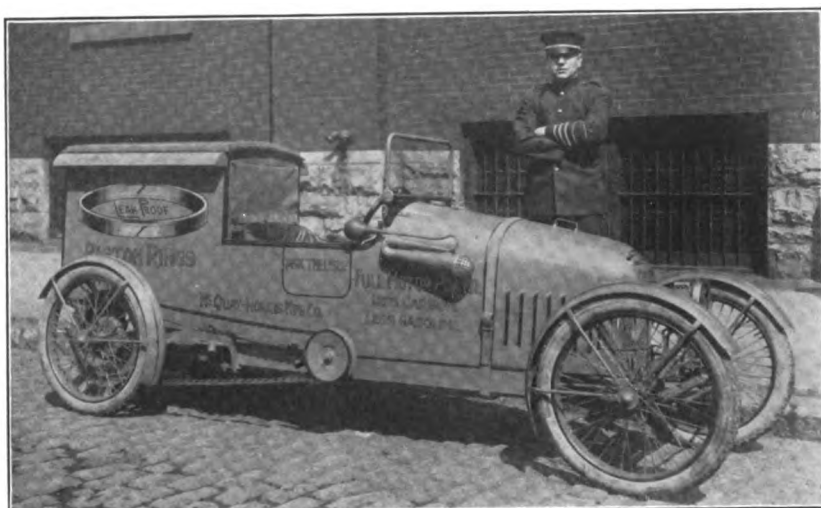
News of New Models and Information Concerning Factory Plans of Older Companies.

The Gadabout Motor Corporation, which has had its executive offices in suite 707, 29 Broad-

way, New York City, is now housed in a factory at the corner of Badger avenue and Runyon street, Newark, N. J., where it is expected that the production of Gadabout cyclecars will be begun in a short time. The present intention of the company is said to be that of manufacturing about 75 cars this first year.

The Twin City Cyclecar Company, 804 South Ninth street, Minneapolis, Minn., announces the Twin City, a true cyclecar, with wheelbase of 101 inches and tread of 36. The machine will seat two persons side by side. The motor is a four-cylinder unit, with bore of 2.5 inches and stroke of 3.5, giving a piston displacement of 67.6 cubic inches and a horsepower of 16-20, according to the maker's rating. Transmission is friction and drive by single chain.

The Dayton Cyclecar Company, Joliet, Ill., is planning to increase its factory facilities, the



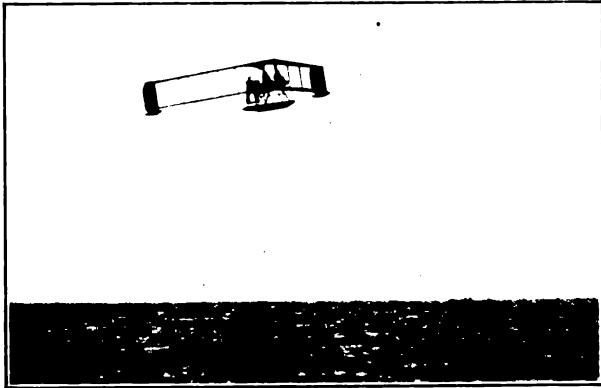
Cyclecar Utilized in City and Suburban Delivery Service of McQuay-Norris Company, St. Louis, Mo., Maker of Leak-Proof Piston Rings.

concern having recently been fully capitalized for \$50,000. The officers are: President, Bruno Schwill, Chicago; vice president, T. F. Donovan; secretary and general manager, W. O. Dayton; treasurer, W. E. Gerry. Other capitalists interested are H. J. Winsten, Racine, Wis., and P. F. Carroll, Joliet.

More complete details of the Cleveland cyclecar, made by the Cleveland Cyclecar Company, Cleveland, O., include the following: Motor, four-cylinder, water-cooled, with bore of 2.25 inches and stroke of four, giving a piston displacement of 63.6 cubic inches, and rated by the maker at 10-16 horsepower; friction transmission, V belt drive, 96-inch wheelbase, 36-inch tread, two passengers, side by side.

THE BURGESS-DUNNE HYDRAEROPLANE.

IN VIEW of the important part which aeroplanes are expected to play in any military occupancy of Mexico, it will prove of interest to



Burgess-Dunne Hydraeroplane in Flight Over Marblehead Harbor.

give some attention to the Burgess-Dunne hydroaeroplane shown in the accompanying illustrations. This is particularly true, as it is rumored that the Burgess company, Marblehead, Mass., has been notified by the War Department to be prepared for rush orders. This report cannot be confirmed, officials of the company explaining that they have been requested to have nothing to say about dealings with the government.

It is known that the United States government has contracted with the Burgess company for a number of machines. Aeroplanes designed by army officers have been produced by this concern, and the works in Marblehead have been regarded more or less in the nature of an experiment station for machines suitable for army and navy work. The company has been engaged in producing aeroplanes since 1908, and undoubtedly has turned out more different types than any other concern in America—most of these on special order.

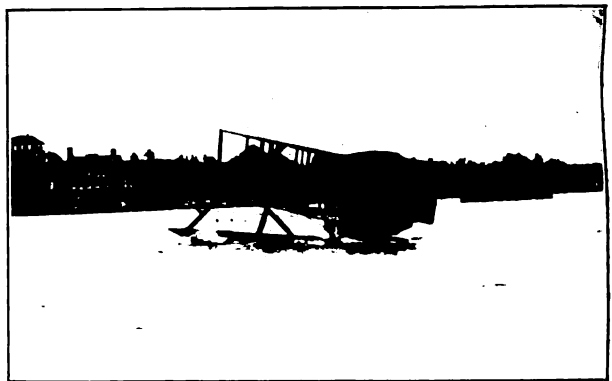
Early in the present year the Burgess company acquired the sole American rights under the Dunne patents. It also works under the Wright patents. The Dunne machine is of special interest, because of its inherent stability, a factor that was demonstrated very forcibly in the first model flown by its designer, a Capt. Dunne in Ireland. It has been found that American army and navy flyers have learned to operate the Burgess-Dunne in two days, while with some other types it has required at least a month.

Capt. Dunne claims to have been the first

aviator to fly without using the control levers. That is to say, in his initial flight with the first model he found it was possible to take his hands from the controls and permit the machine to glide on an even keel. This is held to be due to the fact that there is not a right angle at any point on the machine. The centre of thrust passes absolutely through the longitudinal centre of gravity.

The length of the Burgess-Dunne is 24 feet eight inches; the width, 47 feet, and the height, 11 feet. The total area of the sustaining surface is 482 square feet. The length of the hydroplane is 17 feet eight inches, and this is fitted with five water tight bulkheads. The beam is 31 feet and the depth 15 inches. The motor is a Curtiss model OX, rated at 100 horsepower. The eight-foot propeller is two-bladed. The total weight, ready for flight, is 1450 pounds. It has developed speeds of about 55 miles an hour.

It has been found that the machine rises from the water readily, glides with the power shut off at a moderate angle, and alights on the water with extreme ease. The control levers for the elevators are equipped with an automatic lock, which enables them to be set at any point desired, where they remain until the operator wishes to change his angle or direction. On his fourth flight, Clifford Webster, an aviator with the Burgess Company, allowed the machine to fly itself. There was a puffy wind of 12 miles velocity, but the machine maintained its lateral and fore and aft balance perfectly, although it is stated that a careful observer would have noticed



A Near View of the Burgess-Dunne Hydraeroplane, Approved by the United States Government.

a slight oscillation, in each case immediately overcome by the reaction set up in the various points of the supporting surfaces.

CORRESPONDENCE WITH THE READER.

Over-Running Clutch—F. L. Tarbox, Dorchester, Mass.

What is an over-running clutch? If you have any paper giving a diagram of same, or can tell me what it is, I would like to hear from you.

At Fig. 1 is shown a type of electric motor starter employing an over-running clutch installed on a well known make of motor. The electric motor is secured to a flange on the crankcase of the gasoline engine and the armature shaft carries a small gear F, which drives through three gears, B, C and D, providing a reduction of 40:1, meaning that the gear F makes 40 revolutions to one of the gear, which is on the crankshaft.

The over-running clutch body L is pinned to the crankshaft and revolves with it when the motor is operating, rotating inside the gear B on the line K and in the direction indicated by the arrow. On the face of the clutch body L are three flat surfaces M cut at an angle to the inside of the gear B, on each of which is a hardened steel roller A, held against the flat surface of the clutch body and inside of the gear by a light spring. The roller travels with the clutch and runs free against the side of the gear B when the engine is operating and when the starting gears are idle.

Drive is through the train of gears previously explained. As the clutch body is idle the rotation of the gear B rolls the three rollers until they are bound between the clutch body and the gear, rotating the latter. As the engine speed increases the gear B is rotating at about 70 revolutions a minute and the clutch body several times this, so that the contact of the rollers is broken.

Batteries, Etc.—G. A. Cohasset, Mass.

Please answer the following questions through Correspondence with the Reader:

1—What is the advantage of a Mazda tungsten lamp or bulb for automobile, garage or general lighting?

2—Is the Willard storage battery a non-sulphating battery?

3—How can a person make distilled water for use in a storage battery?

4—Does the Willard storage battery require distilled water or will ordinary water do?

5—Is the electrolyte of all storage batteries composed of one-fifth sulphuric acid and four-fifths distilled water?

6—Which is the stronger, a 14 or a six-volt battery?

1—The advantages of a tungsten filament lamp are: A greater illumination, longer life and less consumption of current as compared with the ordinary carbon incandescent bulbs.

2—No.

3—Distilled water can be made by condensing the steam of ordinary water. It is imperative

that the vessels be clean and free from impurities. It would be cheaper and more satisfactory to purchase distilled water than to attempt to make it, provided, of course, only small quantities were required, such as for a storage battery for example.

4—Distilled water is not absolutely required in the battery mentioned, but it should be pure and free from mineral deposits. Pure distilled water is recommended by all makers of batteries. Ordinary water should not be used until it has been analyzed, as it may contain the impurities above referred to. As previously stated, the distilled water is not expensive and its use will insure satisfaction.

5—The proportion of acid to water in mixing the electrolyte will depend upon the make of bat-

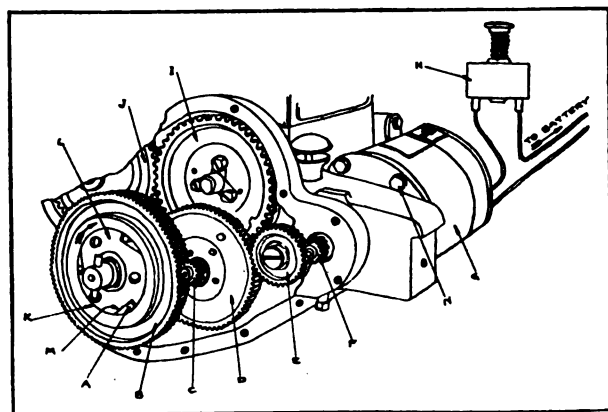


Fig. 1—Illustrating Construction and Operation of Over-Running Clutch Utilised with Motor Starters.

tery; that is, there is variation in the standards fixed for the electrolyte. With LBA cells, when the battery is fully charged the specific gravity of the electrolyte should be between 1.275 and 1.300. With the US cells it is stated: "That the electrolyte must be a chemically pure, dilute sulphuric acid of 1.285 degrees specific gravity, or 32 degrees Baume, or a mixture of approximately one part pure acid to 2.75 parts distilled water by bulk or volume. * * * At the end of the charge the gravity should read 1.280 degrees".

The acid used in mixing electrolyte is assumed to be commercially pure, which is rated at 1.835 specific gravity. Taking this as a basis it is found that at 60 degrees an electrolyte having a density of 1.250 specific gravity will contain 35.50 per cent. of sulphuric acid, and that at 70 degrees it will show 1.247 specific gravity, at 80 degrees 1.244 specific gravity, at 90 degrees,

1.241 specific gravity, and at 100 1.238 specific gravity.

Taking a certain make of battery as an example, the maker states that the best operating result is obtained at a temperature between 70 and 90 degrees, and assuming the average of the two, or 80, as that which will be satisfactory, and desiring an electrolyte of 1.275 specific gravity, it is found that it will contain approximately 39.75 per cent. acid. The exact specific gravity of a 39.75 per cent. acid solution is 1.277, which at 90 degrees would drop to 1.274, and at 100 degrees to 1.271.

There is a difference of 21 degrees, approximately, in the reading of the specific gravity of an electrolyte containing a given volume of sulphuric acid because of the temperature alone, between 30 and 100 degrees Fahrenheit, the density increasing as the temperature decreases. It will be seen that the specific gravity of the elec-

a 40 ampere-hour battery. What size bulbs should I use and how much service will I obtain from one charge of the battery? How are the capacities figured; that is, how many hours lighting would the battery give?

The term ampere-hour as applied to storage batteries is employed to denote its capacity in a closed circuit. A battery that will keep a two-ampere lamp burning for eight hours is said to have a 16 ampere-hour capacity. In a similar manner a 40 ampere-hour battery would operate the same lamp 20 hours. The voltage does not enter into the calculation of the ampere capacity.

The term wattage or watts is now employed in lamp ratings, although candlepower is still referred to by the makers. Regarding the term watt-hour, it may be stated that a current of one ampere flowing in a closed circuit with an electromotive force of one volt is equal to one volt-ampere or one watt. The voltage of the circuit multiplied by the rate of current flowing in am-

peres gives the rate of work or energy expended in watt-hours. Therefore one volt multiplied by one ampere may be stated to be equal to one watt.

It is not necessary to utilize all these units in computing battery and lamp capacity and to simplify matters the ampere and watt may be employed. The voltage may be eliminated insofar as the straight storage battery system of lighting is concerned, as the majority of lighting batteries are rated at six volts.

It will be noted that the lamp catalogue gives the

mean horizontal candlepower in fractions, and the total watts vary from the given figures slightly. For instance, a Mazda six-volt lamp is listed as having a mean horizontal candlepower of 6.1, and the total watts are given as 7.5. The Mazda lamp, it may be stated, is a form of tungsten.

Assuming that the lamp equipment for the car consists of two 10 candlepower headlights, two four candlepower side lights and one two candlepower tail light, the entire equipment, aggregating approximately 31 watts, a 120-ampere-hour, six-volt battery, would give 23 hours continuous lighting.

To simplify matters, let it be assumed that one ampere is equivalent to six watts, inasmuch as it has been explained that an electromotive force of one volt with a current strength of one

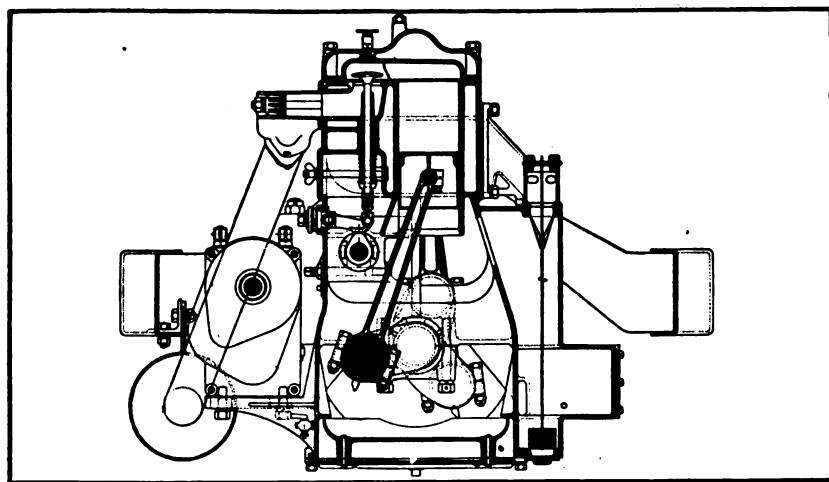


Fig. 2—L-P-C Motor, Used in Lewis Six, Designed by M. Petard.

trolite is an important factor in storage batteries and the manufacturer should always be consulted as to the specific gravity of the solution to be used, also as to charging.

6—The practical units utilized in electrical calculations such as applied to the storage battery are the volt, ampere and ohm, and these are defined in terms of one another as follows: Ohm, the resistance of a conductor through which a current of one ampere will pass when the electromotive force is one volt. Ampere, the quantity of current which will flow through a resistance of one ohm when the electromotive force is one volt. Volt, the electromotive force required to cause a current of one ampere to flow through a resistance of one ohm.

Lighting Batteries—Reader, Cuero, Tex.

I desire to wire my machine for electric lights, using

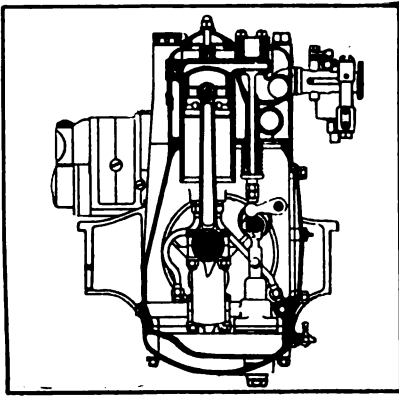


Fig. 3—Sectional View of Dorman Marine Engine with Entirely Enclosed and Lubricated Valves.

lamps may be computed on the same basis. The accompanying table will give approximately the candlepower of lamps, amperes and watts:

C. P.	Amperes	Watts	C. P.	Amperes	Watts
2	0.3	2.46	10	1.6	12.30
4	0.6	4.92	16	2.4	14.76
6	1.0	7.38	20	4.0	24.60

The battery referred to would not supply a group of five lamps or the headlights and tail lamp with current for any great length of time. It would be better to employ a lighting battery of at least 120 ampere-hour capacity. This would depend, of course, on the number of lamps to be utilized and the service expected of the lighting system.

Oil for Valves—L-P-C Motor Co., Racine, Wis.

One of the trade papers in its editorial columns discusses the question of "Oil for Valves", claiming that a British manufacturer has brought out a valve mechanism which is entirely included within the crank chamber and therefore is continuously and positively oiled by the splash of the cranks.

The L-P-C Motor Company in the Lewis designed this valve construction and has used the idea for at least a year. M. Petard, the engineer and designer of the Lewis Six, had plans for this construction in 1912 and as far as we know originated this idea as applied to the automobile motor.

The sectional view (Fig. 2) illustrates fully the complete lubrication of the valve gear, including springs. It will be noted that while there is a plate to facilitate valve adjustment, the entire mechanism, including springs and guides, is within the crankcase walls. The valve guides are exceptionally long, thus eliminating side thrust with perfect lubrication, which is not true of the ordinary valve construction as employed by all other manufacturers. Another feature is the oil bath given the springs, this acting as a cooling agent, adding to their life and insuring a perfect tension at all times.

It will be seen that a rocker arm, which is in constant contact with the cam, is used instead of the ordinary tappet. This, together with the fact that we secure continuous and positive lubrication from the crank splash, insures not only the elimination of valve noise, but absolute freedom from dirt, and is consequently a saving in wear on the valve gear, with a correspondingly silent action of the motor for a longer period than has heretofore been the case with the old construction.

The motor referred to is evidently the Dorman, an engine designed by W. H. Dorman &

ampere is capable of developing an amount of energy called a watt. Having ascertained the number of watts the sum divided by six would denote the number of amperes utilized. Various groups of

Co., which was exhibited recently at the Aero and Motor Boat Exhibition in England. A sectional view is shown at Fig. 3. The entire valve mechanism, including springs, is enclosed, and no tappets are employed, although between the cam and the valve stem a rocking finger is interposed. The valve guides are of exceptional length, almost as long as the valve stems, reducing side thrust to a minimum.

This engine was designed for marine purposes, but in commenting upon the construction. The Autocar of England states that it could be adapted to motor car practise by slight alterations, such as placing the cover plate somewhat higher to make for accessibility, and that the valve springs could be made more accessible without the main feature being lost.

Closely following the publication of the description of the Dorman engine was a letter from F. W. Hudlass, club engineer of the Royal Automobile Club of Great Britain. He claims to have designed the motor shown at Fig. 4 seven years ago. It was a six-cylinder unit and as will be noted the valve mechanism is entirely enclosed in the crankcase, has long valve guides, the components are thoroughly lubricated, and the cylinders are supported from a central position.

Fred H. Caley, secretary of the Cleveland Automobile Club, Cleveland, O., has completed arrangements for the fourth annual special train from that city to Indianapolis and return, for the accommodation of those who desire to attend the 500-mile speedway race, Memorial Day.

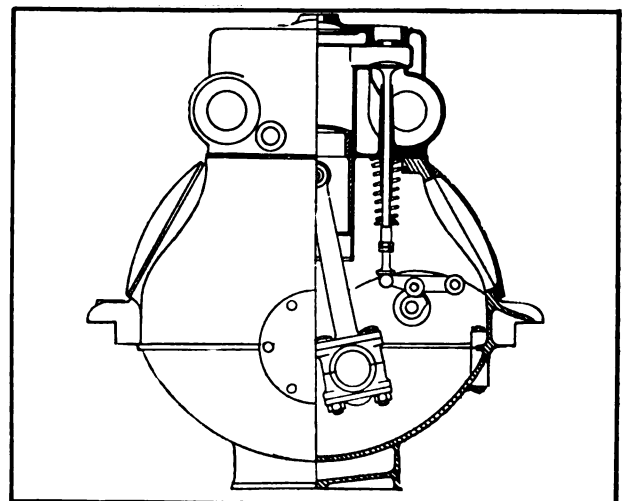


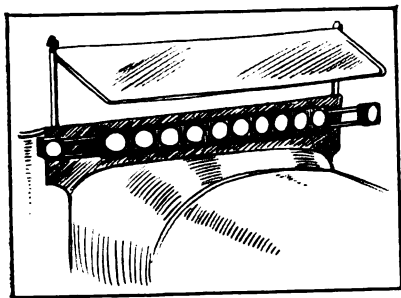
Fig. 4—Transverse Section of a Six-Cylinder Engine Designed in 1907 by F. W. Hudlass, Chief Engineer to the Royal Automobile Club of Great Britain—It Will Be Noted That the Valve Mechanism Is Entirely Enclosed.

WITH THE MOTORING INTERESTS ABROAD.

Ingenious Arrangement of Lamps on Windshield, So Designed As to Throw Light in Any Desired Direction--Gyrocar and Hydrocar---General Foreign News.

AMONG those in attendance at a recent race meet on Brooklands track, Weybridge, England, attention was directed to a new system of electric lighting presented on a Sunbeam car. It is further stated that the same system also has been adopted by the maker of the Sheffield-Simplex. A windshield is termed a screen in Great Britain, and the new arrangement of the lamps is termed a screen light.

It consists of a neat mahogany molding 2.5 inches deep, recessed to hold 12 lamps with their reflectors side by side. It is maintained that the lights can be supplied with current from any dynamo or battery, though those now in use are made for 12 volts. The 12 lamps are wired in parallel, and it is claimed that the failure of one of the bulbs will not greatly depreciate the total volume of illumination for the road. It will be understood, of course, that this screen light entirely replaces the customary headlights.



Arrangement of English Screen Light.

The control is such that all of the 12 lamps can be used together, or three on each side of the central six may be cut out, or the 10 central ones can be cut out, leaving the two outside members as side lights. In fact, the two end lamps are so arranged as to be moved to the ends of the board to better delineate the extreme width of the windshield.

It is stated that the rays can be directed at any desired angle from the horizontal by means of a suitable lever. The light can be thrown down upon the road close to the front of the car, or upward to read a signpost, etc. The beam thrown for driving purposes can be set at an angle best suited to the driver, while the light from some or all of the lamps can be directed upon the engine. With enclosed cars, if preferred, the lights may be placed across the front portion of the roof and adjusted and regulated in exactly the same manner as when mounted on

the windshield. Although the size of lamps utilized is not stated, it is assumed that they are of small candlepower.

CONTINENTAL TOURING FORMALITIES.

An Instance Indicating Reason for Giving Consideration to Foreign Associations.

Because the United States of America is unable to become a signatory to the international convention, which would permit its citizens to motor in foreign countries without being subjected to all manner of customs formalities at the various borders, American motorists are forced to depend upon the good offices of automobile associations in Europe. Many secure membership in the Automobile Association & Motor Union of Great Britain, while others prefer the Automobile Club de France.

These bodies are very willing to act for American motorists, but it sometimes happens that the tourist neglects to make plans sufficiently far in advance. A recent instance of this nature will serve to indicate some of the steps which must be taken by the foreign association in order that the tourist may not be delayed, when essentials have been overlooked.

An American desiring to tour Continental Europe secured membership in the Automobile Association & Motor Union of Great Britain, notified the officials of that body that he would arrive in Southampton by a certain steamer, and requested that he be fitted out with triptyque and other papers in time to take the first boat from Newhaven across the channel.

The boat arrived so that the passengers began to disembark at 8:05 in the morning. At 8:25 the tourist stepped ashore, and within seven minutes he was posed before a camera, in order to comply with the rule insisting that a portrait of the driver using the international permit be sealed on the document. Registration plates, and a specially engraved dash plate required on cars visiting the Continent were then ordered, and an English driving license was obtained. At 10:16 the car was landed, and by 11:10 the tires, which had been removed for shipment, were fitted and the machine was ready for the examiner to obtain the necessary information for the various

spaces on the triptyque and international pass. Next came the driving examination in order that the continental driving certificate could be obtained, and at 1:30 in the afternoon the motorist was on his way to Newhaven, having received, in addition to triptyques for France, Germany, Italy, Switzerland and Austria and the international pass, his shipping tickets, delivery note, and even the strip of transparent green paper which must be affixed to right side lamp to conform with continental regulations.

DURAY'S HIGH POWERED FIAT.

Machine with Which He Is Said to Have Exceeded Burman's Kilometer Record.

Arthur Duray, who is at present in this country in order to drive a Peugeot in the Indianapolis 500-mile race, was forced to leave his 300 horsepower Fiat in France. This machine is shown herewith, and it is stated that Duray recently covered a flying kilometer in Belgium at the rate of 142.9 miles an hour, this exceeding the mark of 141.75 miles an hour set by Robert Burman in the 200 horsepower Blitzen Benz at Daytona, Fla., April 23, 1911.

An attempt was made to secure this record on the beach at Ostend, Dec. 2, 1913, but the speed attained was not sufficient. Burman's mark still stands because Duray was compelled to drive his Fiat under European regulations, which require mean time taken in covering the measured distance in both directions. He hoped to bring the machine to America in order that he might attack the record under American regulations. He says the car is capable of covering the distance at the rate of 150 miles a minute.

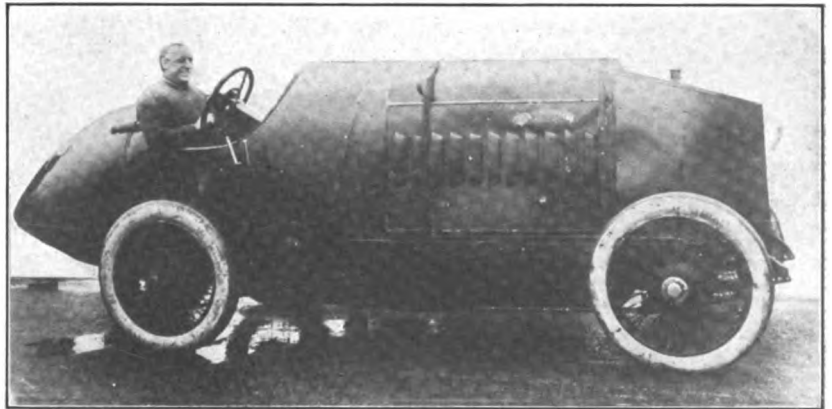
DR. SCHILOWSKY'S GYROCAR.

Londoners Are Given Opportunity to Witness Its Initial Public Test.

A few weeks ago announcement was made in these columns that the Wolseley works in England was engaged upon the production of a new two-wheeled gyrocar. At that time it was impossible to present details, and this is still true

in a measure, despite the fact that this machine recently was given its initial public test in London. The design is that of Dr. Pierre Schilowsky.

The machine is briefly described in the dispatches as a two-wheeled, single-track, three-ton, 20 horsepower pleasure car. The motor drives a dynamo which supplies current for working the gyroscope by means of a pendulum on either side of the car, each ordinarily free on a ratchet device. It is explained that when it becomes necessary for the speed of the gyroscope to be increased, the pendulum engages the ratchet until the gyro has been hurried to the desired number of revolutions, when a slight noise is heard, this being made by a spring disengaging the ratchet device. Power is transmitted to the single rear wheel by an ordinary gearbox of the standard Wolseley ratios, although a new transmission is under consideration.



Arthur Duray and His 300 Horsepower Fiat Car, with Which He Has Attained a Speed of 142.9 Miles an Hour.

The gyroscope is utilized for maintaining the car's balance when turning corners, when standing still with the motor running, etc., and it is stated that the public test demonstrated that it is capable of performing its functions satisfactorily in every respect. Two sprag wheels, one on each side, are lowered when the car and motor are stopped. It is stated that the gyroscope absorbs about 1.25 horsepower. The two road wheels are shod with pneumatic tires.

LAMBERT HYDROCAR.

Interesting Amphibious Machine Has Made Its Appearance from Scotland.

If a boat that is supplied with wings is an hydroplane, and an aeroplane that is fitted with floats is an hydraeroplane, there seems no good

reason why a motor car that is designed for use on land and in the water should not be an hydro-car. To be sure, amphibious automobiles first made their appearance some few years ago, but, if memory serves correctly, those machines were designed to operate only where the wheels could touch bottom, so to speak.

Leslie Lambert of Drumchapel, near Glasgow, Scotland, has produced an automobile of the cyclecar type, fitted with a single-cylinder, water-cooled engine of 4.5 horsepower, which not only operates satisfactorily on land, according to the reports received in this country, but is equally well adapted for water service. It is supplied with a small propeller at the rear, actuated by a two-speed gearbox and an extra bevel gear engaged by means of a dog clutch. When taking to the water the machine floats and is manoeuvred like a boat.

FRENCH LIGHT CAR TRIALS.

Eighteen of 22 Starters Complete 2000-Mile Endurance and Fuel Economy Tests.

Eighteen of the 22 starters completed the 2000-mile endurance and fuel economy tests around France early in the month. The event occupied 10 days, and the road and weather conditions were ideal throughout. The largest car in the competition had piston displacement of 153 cubic inches, and the smallest, 54. The result for gasoline economy was as follows:

Car	Gallons	M. P. G.
Hurtu	46.03	42.4
Alva	46.22	42.3
Majola	47.89	40.7
Automobilette	51.40	38.1
Autorette	53.46	36.5
Phoenix	54.36	36.0
Gep	55.02	35.0
Ponette	57.55	34.0
Sigma	59.70	32.8
Automobilette	62.30	31.4
Scap	62.30	31.4
Aquila-Italians	63.95	30.6
Diatto	64.04	30.5
Arlan	71.25	27.4
Scap	75.52	25.9
Fox	79.23	24.7
Hispano-Sulza	94.64	20.7
Humber	96.55	20.3

NEWS NOTES FROM ABROAD.

The authorities of French Indo-China have begun a series of engineering works for the establishment of a motor road 1000 miles long between Hanoi and Saigon. Ten bridges are to be built, and the highway will cross no less than three mountain ranges.

There were 5115 motor cars imported into Argentina during 1913, as compared with 4281 during 1912. Recent reports show that there are 6453 automobiles in Buenos Aires alone, of which 2470 are privately owned passenger machines, 3940 taxicabs and 243 commercial vehicles.

Thirteen cars already have been entered for the Austrian Alpine tour, as follows: Puch, Archduke Josef

Ferdinand; Puch, Archduke Heinrich Ferdinand; Graf, Baron Vladimir Steinhell, St. Petersburg, Russia; Darracq (three cars), Darracq et Cie; Puch, Count Carl Lemberg; Fiat, Martin Schneeweiss; Graf, Rudolph Lenbacher; Opel, R. K. Rosenheim; Minerva-Knight, Dr. B. Bleichroeder; W. A. F., Francis Fuchs; Vauxhall, Tinsley Waterhouse.

With the exception of the cars of two manufacturers, all the machines entered for the French Grand Prix this year will be equipped with Rudge-Whitworth wire wheels. It is expected that one of the remaining two will yet adopt this equipment.

The Imperial German Automobile Club has arranged to hold a reliability tour in October, under the patronage of Prince Henry of Prussia. The contestants will be divided into two classes. The distance will be about 800 miles, covered in two days by large cars and in three by small machines. Entries close Aug. 15, with the Kaiserlicher Automobil Klub, Leipzigerplatz, 16, Berlin, W. 9.

Word has been received from Sydney, Australia, that a Metz car, made by the Metz Company, Waltham, Mass., was a winner in the recent reliability trials between that city and Melbourne, securing a total of 598 points out of a possible 600. This was the same car that won in 1913 with a perfect score. The gasoline consumption was 51.5 miles to the gallon, indicating a cost of a little less than .5 cent a mile.

IN RE SOUTHERN TREAD.

Improvement of Highways in That Section Is Gradually Eradicating the Distinction.

While but few northern motorists may be aware of the fact, practically all automobile manufacturers have been producing cars a little differently equipped to meet the demands of the trade in the South. That is to say, machines built especially for the southern buyer have a tread of 60 inches instead of 56.

The conditions which first brought about this distinction have been the subject of argument among vehicle manufacturers for many years. General opinion seems to agree, however, that, on account of the road situation which once prevailed south of the Mason and Dixon line, the wider tread was adopted to insure needed stability and prevent overturning.

The standard was established long before the day of the motor car, but even when automobiles began to be used more generally there was still a disposition on the part of the southern buyer to give preference to a wide tread machine. That there has been a marked lessening of this tendency during the past two seasons is stated by E. R. Benson, vice president of the Studebaker Corporation, Detroit, in charge of automobile distribution. He adds:

The day is past when the southern motorist was compelled to ride as best he could in the wagon ruts of the country roads. Highways in many parts of the South are now not merely equal, but actually better than those in many parts of the North, populated with similar density. Even in the mountain districts where wide tread wagons are still generally used, the motorist will find roads that are almost always crowned, and often macadamized. A large majority of the cars we have been shipping to our southern dealers this year have been equipped with standard tread. So marked has been this trend that it seems only a matter of education until the standard becomes general.

GASOLINE CONSUMPTION RECORD.

Rayfield Carburetor and Motorol Help Chandler to Win Coveted Honor.

What is believed to be a national record for gasoline consumption with a six-cylinder machine was made recently in Chicago by W. C. Gruner, representing the Thomas J. Hay Company, local distributor for Chandler and Hupmobile cars, with a Chandler car, made by the Chandler Motor Car Company, Cleveland, O. The machine was equipped with a Rayfield carburetor, made by the Findeisen & Kropf Manufacturing Company, Chicago, and utilized Motorol, the product of the New York & New Jersey Lubricant Company, 165 Broadway, New York City. The test was superintended by F. E. Edwards, chairman of the technical committee of the Chicago Automobile Club, assisted by Darwin S. Hatch.

One gallon of gasoline carried the car 24.4 miles during a period of 1:15:00, with an average speed of 20 miles an hour. The test combined three features, fuel economy, acceleration of speed in the third gear mounting Hubbard Woods hill, and acceleration from a standing start up the same incline. The car carried its full equipment, including windshield and spare tires, and was occupied by four persons. Tires were 34 by four-inch, fitted to demountable rims. The machine weighed 3030 pounds without passengers, and with them 3700 pounds.

At the start the carburetor adjustments were soldered and even the dash adjustment was removed. A special one-gallon tank was filled with ordinary gasoline, showing in the cold temperature a specific gravity of 60 degrees. The day happened to be decidedly unfavorable for such a record. The wind was strong from the northeast, and the temperature but 52 degrees at the start and only 56 at the finish.

SPEARE SELECTS BETHLEHEM.

Maplewood Hotel Will Be American Automobile Association's Headquarters.

Lewis R. Speare of Boston, chairman of the special committee in charge of the arrangements

for the midsummer meeting of the American Automobile Association, has decided upon Bethlehem, N. H., as the meeting place, and the Maplewood hotel as the official headquarters. The dates selected are July 3-5.

Mr. Speare has added a number of names to the committee, which now includes Frank X. Mudd, Chicago; Dr. H. M. Rowe, Baltimore; Laurens Enos, Buffalo; Robert P. Hooper, Philadelphia; Alfred Reeves, New York, and James Fortescue, Boston.

PREMIER ADDS TO LINE.

Announcement Is Made of a New Series Utilizing the Weidely Chassis.

Announcement is made by the Premier Motor Manufacturing Company, Indianapolis, Ind.,



Chandler Six, Equipped with Rayfield Carburetor and Using Non-Fluid Oil, at End of Its Recent Record Breaking Gasoline Consumption Test.

of a new series Premier 6-49, utilizing the Weidely chassis and being equipped with a six-cylinder motor having bore of 4.5 inches and stroke of five. The streamline body is designed and constructed along the most up-to-date lines.

Recently, E. S. Partridge of New York City, one of the pioneers of the industry, having been connected therewith since its inception, made a tour of the Middle West, and during his visit to Indianapolis took advantage of an opportunity to try out two of the Premier-Weidely chassis on the speedway in that city. He succeeded in averaging 68 miles an hour, and attaining much higher speeds on the straightaways. At the conclusion of the test he expressed himself as highly pleased with the performance of the machines, and particularly with the action of the Weidely motor under all the conditions to which it was subjected.



fer upon the industry as a whole.

It is somewhat indicative of the tendency toward strictly business methods, which has been in evidence most conspicuously during the past year, to note that this spirit of organization is being extended to other branches of the mechanical force. Men more directly responsible for constructional details, than is true of the engineer, are forming societies for the purpose of exchanging ideas and listening to authorities relative to the proper means to be employed in securing definite results.

The automobile owner may not be conversant with the respective merits of case hardening, case carburizing, heat treating, etc., but he expects the manufacturer to delve into these mysteries, and when he learns that shop foremen and heads of departments are devoting time to the scientific study of such matters, he immediately has greater confidence in the product of the industry. The practicability of the motor vehicle has long been established. The efficiency of motor vehicle production is now receiving marked attention.

KILLING THE GOOSE.

Motorists in Massachusetts have been contributing more than \$700,000 annually in registration fees toward highway maintenance. Until now there has been practically no objection.

The state highway commission, which instigated the present plan for increasing the registration fees on motor trucks, reports that horse vehicles do much damage to roads, yet makes no provision for requiring that they be made to bear their share of the maintenance cost. Actual figures show that the ordinary horse will cut some 12,000 holes in a roadway for every mile travelled. Also, it can be demonstrated that motor trucks on the highways comprise less than 10 per cent. of the traffic, while the horse drawn vehicles comprise about 40 per cent. Hundreds of motor trucks never go outside the cities.

Since the supreme courts of Mississippi, Ohio and Michigan have decided that laws enacted recently were unconstitutional, because they imposed double taxation on motor vehicles, the motorists of Massachusetts may be pardoned if they are considering the advisability of testing the existing statute, and any others that may be passed, in the courts. Many attorneys state that they would win.

STUDYING EFFICIENCY METHODS.

The automobile industry has grown very rapidly. It is but a comparatively few years since practically the entire attention of the mechanical department was devoted to the matter of making the machine run. There still are a large number of subjects involving questions of design and construction, about which engineers and owners will long continue to have differences of opinion. Some of these are of sufficient importance to warrant consideration in the light of selling points, and, therefore, to be made the basis of argument among all connected with the industry, in whatever capacity.

However, it is proper to refer to the present day motor vehicle as a standardized product, and it is possible for those directly responsible for design and construction to form themselves into an association for the advancement of ideas and the consideration of suggestions, as is demonstrated by the successful history of the Society of Automobile Engineers. The average automobile owner may have little interest in the proceedings of such organizations, but he cannot fail to appreciate the benefit they are able to con-

PRODUCING MOTOR CARS IN QUANTITY.

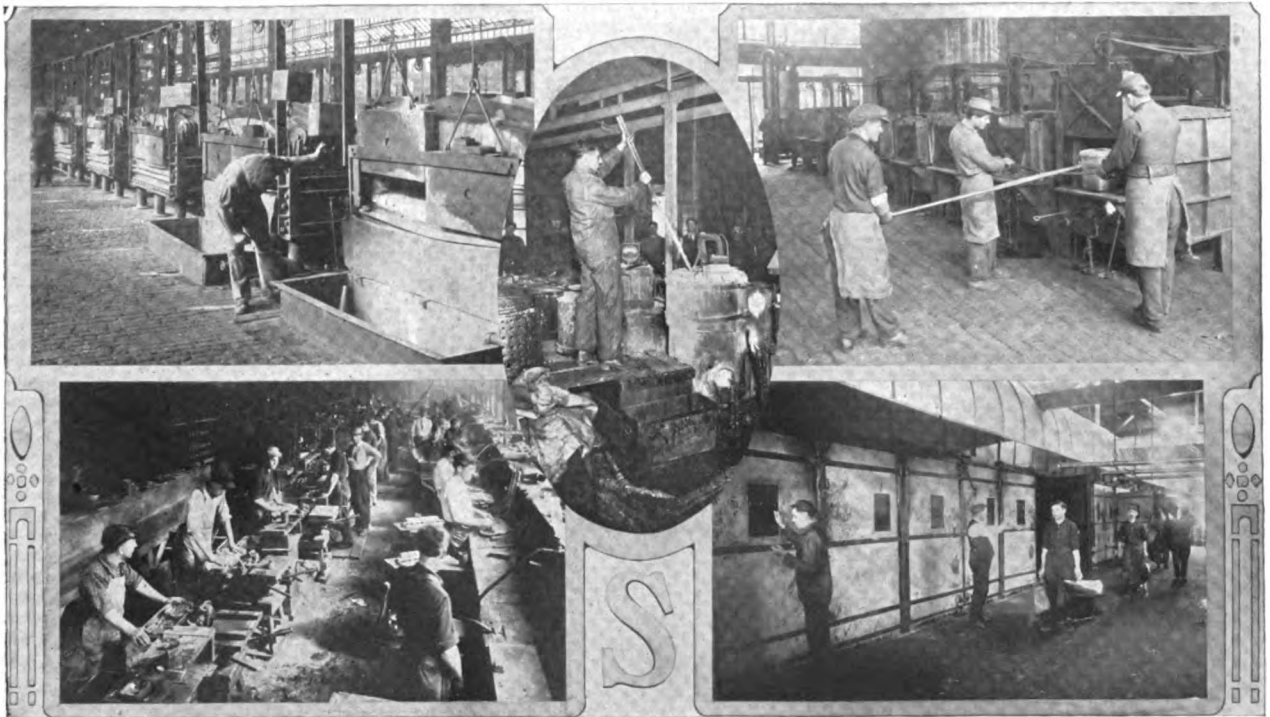
Manufacturing Methods Utilized by the Studebaker Corporation Which Builds 65,-000 Automobiles Annually---Factors Contributing to a Large Production.

IT IS a well known axiom of manufacturing that production in large quantities enables the builder to lower notably the cost of each article he makes. The automobile manufacturer whose product runs to five figures annually necessarily must have almost unlimited resources, with his plants located at points of vantage, adjacent to trunk lines, waterways, and in juxtaposition to materials of the desired stamp. Sanitation, light, heat and pleasant surroundings are most carefully utilized in modern factories, as the quality of the product increases with the output under these conditions. It is the advance that has been made in automatic machines and tools and methods that is responsible for production in large quantity, and it may be stated that quality is on a higher plane than formerly.

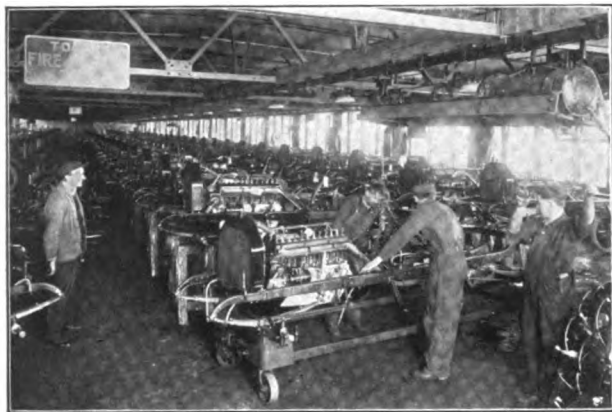
The motor car manufacturer whose plants have a capacity in excess of 50,000 machines a year can afford to command the best engineering

talent, and to employ the most efficient heads of departments and expert labor. The purchase of material is a well known factor in manufacturing, and it is obvious that competition is keen among makers of raw material when it is to be supplied in enormous quantities. It follows that the car manufacturer, concentrating his efforts on one or two models, and producing in large quantities, can install equipment that will produce parts at a minimum of cost.

The Studebaker Corporation of America, Detroit, exemplifies the quantity production, as the capacity of its plants is 65,000 cars annually. The units entering into the construction of its product are built in the Studebaker plants, which are equipped with specially designed machinery for turning out accurate, perfect fitting components. Throughout attention is given to those minor details which make up one harmonious, well balanced whole. From the time the raw material



Producing Studebaker Cars: Upper Left Hand View, Heat Treating Ovens at Plant No. 4; Left Hand Lower, Forming the Cores for Block Cylinder Castings; Centre, Heat Treatment of Camshaft After Forging but Before Grinding; Upper Right Hand, Battery of Heat Treating Ovens at No. 3 Plant, Showing Manner of Treating Small Parts by Means of a Metal Basket; Lower Right Hand, Enamelling Ovens Where Pressed Steel Parts, Such as Fenders, Hoods, Etc., Are Finished.



The Chassis in the Paint Shop—The Illustration Gives Some Idea of the Production in Large Quantity.

enters the factories until it leaves in the finished product, the automobile, the processes are interesting, and few motorists realize the detail attendant upon the work.

In kinetic machines, such as automobiles, alloy steel is necessary in many of the more important parts, and even the components that are fashioned from the more ordinary grades of steel are made from better materials of better selection than would be true in many other genera of machines. The development of steel from iron is a science, and the quality of the product varies widely. The steel utilized in the Studebaker cars is supplied according to specifications determined by the company's engineers and samples of each invoice are cut off and sent to the laboratories, where they are ground to dust and scientifically tested. Even the finished material, such as axles, connecting rods, etc., is placed in special machines, subjected to twisting and breaking stresses, and the energy required carefully noted. The broken parts are then inspected.

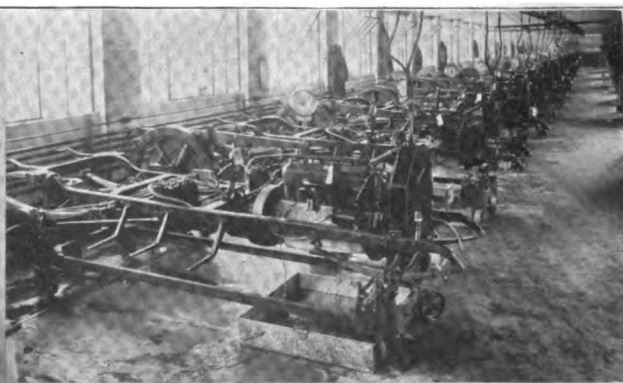
Every piece of steel utilized in Studebaker cars is subjected to at least from four to six special

heat treatments, previous to which the grain of the metal is coarse and easily discernible. After the forging operations, and application of the right degree of heat, the grain is much finer, as the particles are much closer together and the substances more compact. When the forging and heat treating is scientifically determined, the grain is absolutely uniform and free from fissures or flaws of any kind, and there is an even solidity of the structure throughout.

Different kinds of heat treatment are required for various steel and the exact method is determined by exhaustive and painstaking study. The components of the chassis are called upon to meet certain specific and widely different strains and stresses, and it is the duty of the engineers to provide a steel that will not only withstand these stresses but obtain a margin of safety.

If, for example, the steel is to be employed for a camshaft, a part requiring a hard surface to withstand the wear on cams and bearing surfaces: After being approved by the experts it is given its first heat treatment, after which it is forged to shape. The second heat treatment anneals the steel and refines the grain, after which it is milled or machined. The shaft is then packed in a compound, which, under the application of heat, will cause carbon to combine with the steel. This heat treatment is continued under a predetermined temperature for several hours, and during the process carbon slowly combines with the steel to a depth of a .0625 inch, leaving the surface very hard.

The fourth treatment is interesting. The camshaft is plunged into a bath of molten lead heated to exactly the right temperature. The lead is utilized for several purposes. It secures a uniform heat, excludes air and prevents the oxygen in the air oxidizing or scaling the surface of the steel. This treatment refines the grain of the core, making it extremely tough.



At Left, Assembling Studebaker Six Motors at the No. 1 Plant; at Right, Chassis Lined up for Dynamometer Tests—The Cars Run Under Their Own Power and the Capacity of This Room is 90 Chassis Daily.



At Left, Hoods for the Studebaker Four and Six in the Process of Manufacture; at Right, Placing the Finishing Touches on the Crowned Fenders.

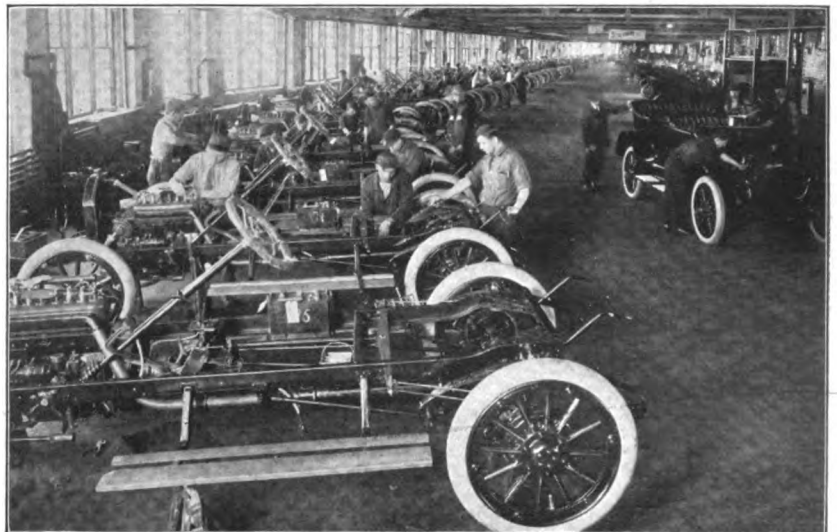
The fifth heat treatment is also a bath of molten lead, used to harden the carbon surface, which has been slightly softened by the previous treatment. The temperature is just sufficient to harden or temper the outside, but not so great as to toughen the core. After this the camshaft is plunged in a bath of oil, and when taken out is ready for the final milling or grinding operations, special emery wheels being utilized, as the metal cannot be touched by ordinary tools. Gears pass through similar treatments and in addition are given a sixth heat treatment and quenched in oil to eliminate brittleness. The hardness of the heat treated steel is tested by a diamond pointed instrument, called the scleroscope, which measures the degree of hardness with unvarying accuracy.

Although there may be as many as 25 operations in the manufacture of a certain part, the Studebaker inspection system provides for an inspection after each step. The inspector must see that parts are milled to certain standards of accuracy and a very fine measuring device, termed a dial faced gauge, is utilized. By a system of gears the gauge measures easily and accurately a thickness less than that of the thinnest paper. It also measures the degree of angles, the centering of gear wheels on their axis, and tests the side of a gear wheel to see if it is perfectly true.

Crankshafts are balanced by placing the end bearings on knife blades, supported on a steel frame. If any side of the shaft is heavier than

another, the shaft will turn until the heavy part is underneath. If not perfectly balanced the inspector returns it for grinding. The gear wheels, differential and timing gears are tested with master gears under various pressures to insure perfect engagement of the teeth, and the slightest variation is indicated on a slide rule. The limits are very close.

An important factor in motor construction is the proper casting of the cylinders, pistons and upper part of the crankcase. The casting is made of a certain proportion of best iron ore and scrap steel melted together in a cupola, a coke furnace generating tremendous heat under forced draft. At the bottom of the cupola the molten metal is poured off free from slag or flux into the forms constructed by expert workmen. After the forms, or cores as they are called, are made, they are placed on mammoth trucks and rolled into an immense oven, where they are baked slowly until



View of the Final Assembly of the Studebaker Four at Plant No. 3.



The Studebaker Technical School Where Free Instruction Is Given to Dealers and Their Employees—A Three Weeks' Course Is Provided.

the sand is firmly cemented together by the action of the heat on the compound mixed with the sand.

These cores form the hollow place in the casting after it is finished. They are set in sand molds and the iron is poured around them, forming a wall between the core and the mold. After the metal hardens, the sand cores are pulverized, the reinforcing wires drawn out through openings in the casting, and the rough piece is then complete. All sand remaining in the mold is jarred out by placing the castings in a revolving receptacle.

The grinding is accurately performed by a large machine and after the surfaces are perfectly square, the cylinders are placed on another machine, where auger drills accurately set to a one thousandth of an inch, grind them out, four and six at a time. Special multiple spindle drills in connection with jigs bore out the passages for the valve stem and pushrod bushings, valve seats, etc., a single operation boring the openings simultaneously. After the cylinder is complete it is placed in a testing apparatus and subjected to compressed air and water under test, which insures a perfect motor casting.

The Studebaker pistons are not only made to standards requiring extreme accuracy, but the borings for the wristpin bearing must square absolutely to the side of the piston in either direction. Two steel plugs are utilized for testing, one with a diameter of one one-thousandth

greater than the other. The smaller one must exactly fit the boring.

After the motor is assembled it is sent to the testing building, where it is clamped in a steel frame and run under its own power for several hours under a load similar to that in service. This and other tests reveal any imperfections. The assembly of the rear axle is made as carefully as that of a motor. It passes through a block test, being clamped to a frame and operated under power and load. Specially built trucks are utilized to transport the chassis to the testing room, eliminating the use of axles and wheels. An accompanying illustration shows the chassis of the Studebaker Six lined up for dynamometer test in the No. 1 plant, with the cars running under their own power. The capacity of the room is 90 completely tested chassis in the nine-hour working day.

When the chassis is finally assembled, it is turned over to the testing department, fitted with a rough body and loaded with several hundred pounds of iron to bring the weight up to that of a finished car with its complement of passengers. The machine is operated over country roads, at different speeds, on grades, etc., and if any part does not meet the exacting requirements it is returned to the proper department. After receiving the tester's O. K. the body is removed, the chassis washed and sent to the paint rooms.

Even the springs utilized are tested. They are placed in machines which apply forces corresponding to those met in actual use. The spring is rapidly vibrated under this pressure for days at a time, and finally, when it wears out, its structure is studied by metal experts. This



Illustrating the Final Steps in Preparing the Studebaker Cars for Shipment.

method has resulted in the production of springs which will withstand three times the usage under which springs of two or three years ago would have collapsed.

Pressed steel stampings are very tough and can be made to withstand severe strain in every direction, and they can be made to be very light in weight without sacrificing toughness and durability. The Studebaker Corporation maintains a large stamping plant and such parts as running board brackets, clutch cones, crowned fenders, lower part of the crankcase, etc., are made of stamped steel. The steel is rolled out in strips of predetermined thicknesses and pressed under immense dies into the shapes required. Attached to the stamping plant is a series of enamelling ovens where the fenders and other exposed parts are given a baked finish.

The framework of each Studebaker body, like the other components of the car, is specified and requires certain standard materials. The wood employed is first quality seasoned ash, cut by automatic machinery to unvarying standards. It is reinforced by steel bracework, forged in the forge plant. The backs of the seats and cushions are upholstered by hand, and the tops are built on the body and not on a frame or jig, insuring a perfect fit.

The finish on Studebaker cars comprises 24 paint and varnish operations. The various coats of filler paint are carefully applied and rubbed before the first touch of color goes on and sufficient time is given for each coat to age before the next is applied. The varnish room is especially adapted for producing high grade work.

After the chassis is painted it is wheeled through a door and over a short bridge to a final assembly room, where the body is applied. As the sills are accurately made there is no occasion for fitting, economizing in time. The fenders, top, hood, windshield and other various parts are assembled in order and new wheels and tires, of course, replace those employed in the road testing. The electric lighting and motor starting system is included in the tests and inspection, and the completed machine is ready for the shipping docks of the factory.

The facilities are adequate and before the seal is placed on the freight car door, an inspector must place the final O. K. on the shipment. It is duty to see that every part is complete and perfect and that none is likely to become damaged in transit.

It is the careful inspection of the raw material and that of the various steps in the process of manufacture until the machine is ready for ship-

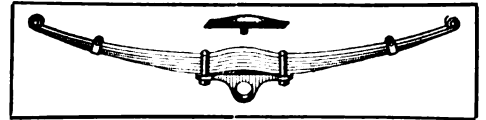
ment that has made the name of Studebaker well and favorably known to the motoring public of two hemispheres.

TUTHILL TITANIC SPRING.

Eliminates Centre Hole and Is Guaranteed Against Centre Breakage.

It is estimated by those familiar with motor car spring construction that a large majority of broken springs is traceable to the centre hole utilized for a bolt, which binds the leaves together. A spring that presents practical features and one which is guaranteed absolutely against centre breakage is the Tuthill Titanic, manufactured by the Tuthill Spring Company, 760 Polk street, Chicago.

As will be noted by the accompanying illustration, the centre hole is eliminated and that section is made the strongest. An upward curve, in connection with a retaining plate between the two clips, holds the leaves in position, as well as makes for great strength. In addition to this feature the steel utilized is manufactured according to a special formula and two analyses



Tuthill Titanic Spring.

are made of each lot before being utilized. The completed springs are given a series of tests before passing inspection, which is very rigid.

The company carries in stock a large number of types adapted for standard makes of machines and is prepared to produce special designs at short notice. A feature of the policy of the Tuthill Spring Company is its service. Price lists and complete details will be supplied on request.

Ralph F. Herrick, Arcata, Cal., reports to the Paige-Detroit Motor Car Company, Detroit, Mich., that he recently drove his Paige car over what is known as Mathews hill in that town, which has a grade of 38 per cent. A certificate accompanying the report states that this is the first time the hill has been ascended by a motor car.

Roy Daniel, New Albany, Ind., reports that he has covered more than 125,000 miles with his 1907 Kissel Kar, made by the Kissel Motor Car Company, Hartford, Wis., and has been using it for some time as a converted machine, for transporting plumbers' tools and supplies.

IMPROVED HIGHWAYS AND MOTORING LAWS.

Over 1000 Miles of Road Secured Attention in New England During the Last Year---Automobile Manufacturers Outline Policy for Highway Authorities.

SOMETHING over 1000 miles of highways in the six New England states were constructed or improved during 1913, according to the best figures available. Nearly half of this mileage applies in Massachusetts, where the state highway commission completed over 49 miles of state highway, treated 500 miles of state highway with bituminous materials and resurfaced 33 miles of the older roads. Of the 980 miles of state highway in that commonwealth, 881 have now been treated with some form of bituminous material, either in resurfacing or on the surface.

Maine entered the list of states appropriating large sums for state highways in 1913, the legislature having set aside \$2,000,000 for such work.

NEW ENGLAND EXPENDITURES FOR 1913.

	State.		
	Construction	Maintenance	Total
Maine	\$750,676.44	\$8,207.36	\$758,883.80
Massachusetts	1,034,902.00	819,854.47	1,854,756.47
New Hampshire	313,022.75	109,660.57	422,683.32
Rhode Island	279,733.00	260,864.00	540,597.00
Vermont	385,000.00	90,000.00	475,000.00
Totals.....	\$2,763,334.19	\$1,288,586.40	\$4,051,920.59
Connecticut			1,850,000.00
Grand total.....			\$5,901,920.59

Cities and Towns.

Maine	\$1,500,000.00
Massachusetts	9,559,681.00
New Hampshire	240,000.00
Rhode Island	390,000.00
Vermont	225,000.00
Connecticut	1,250,000.00

Total..... 13,164,681.00

Total expenditures, state and local.....\$19,066,601.59

*Connecticut funds undivided.

During the year 163.3 miles of road work was done under the supervision of the state highway department. Plans have been laid for an even larger amount of such work during 1914.

Vermont built some 200 miles of road during 1913. The plan of improvement remains the same, being that of constantly improving the worst places throughout the 4000 miles of selected highways, using gravel or gravel-telford construction.

New Hampshire contributed 106 miles toward the present total of 840 miles of hard surface roads in that commonwealth. All roads built are completed partly at the expense of the

state and partly at the expense of local subdivisions.

According to reports from state highway officials, as appearing in the year book of the American Highway Association, the expenditures by state and local authorities in these six states for the year were as presented in the accompanying table.

OUTLINES ROAD POLICY.

National Automobile Chamber of Commerce Advises Highway Authorities.

After carefully considering the subject of improved highways, the National Automobile Chamber of Commerce has formulated a road policy which it suggests for the benefit of highway authorities who desire to reconcile the demands of automobilists and business men for permanent intercity highways and of farmers for improved tributary roads with the objection of taxpayers to increased road taxes. The suggestions take the form of the following:

Take a census of traffic to ascertain the number and kinds of vehicles using the state roads at different points.

Build brick, concrete or other durable roads wherever there is much heavy teaming, motor trucking and automobile driving.

Such roads should be built wherever the cost of properly maintaining any other kind would amount to more in 25 years than the cost of maintaining the durable road plus its extra first cost and interest on the excess.

Issue 15-year to 25-year bonds to pay for permanent work if sufficient funds are not available. It is sound economic policy to raise money with bonds for all road work that will out-live the term of the bonds.

Pay out of current funds provided by general taxation and assessment the cost of surfacing with any material that is not as durable as brick or concrete.

Make gravel roads where traffic is comparatively light and there is not much automobile travel, first grading and draining the foundation thoroughly.

Extend the mileage of permanent highways with money saved by building gravel roads instead of macadam roads.

Confine construction as much as possible to durable roads and gravel roads so that the total cost will not exceed that of an equal mileage of macadam roads nor increase the state or county expenditure.

Use quartz, shells, burnt clay or a mixture of sand and clay where gravel is not readily obtainable. They are all good substances.

Grade and drain the earth roads and insist upon having them dragged in spring and fall. If necessary, get a drag law passed similar to those in Iowa and Ohio. Drag the gravel roads also in spring and fall, and apply new gravel to ruts and depressions.

Concentrate the expenditure of state funds on the improvement and maintenance of intercity or trunk lines, because they carry about 80 per cent. of the total traffic.

Instead of depending for road funds upon uncertain

appropriations by legislature, provide by law for an annual levy on all taxable property.

Work convicts on the roads and in the production of road materials, thereby cutting down the labor cost.

Have the state or county acquire or lease gravel and sand pits and install modern excavating, sifting and washing machinery to reduce the cost of materials.

Select the most suitable materials nearest the roads to be improved, remembering that haulage is a large item of expense.

Call for bids on long stretches or big mileages of road in one locality, to be built at one time, thus enabling contractors to use motor trucks or tractors for hauling and other special labor and time saving machinery.

Test all materials before use and see that the contractors live up to specifications. Also make certain that the most successful methods are followed in building brick and concrete roads.

TO INTERPRET LIGHT LAW.

Massachusetts State Highway Commission Asked to Reconcile Wording of Statutes.

When the Massachusetts legislature recently enacted the amended light law, applying to horse drawn vehicles, it apparently overlooked the wording of the motoring statute respecting this matter as applied to automobiles, and, as a result, motorists in that commonwealth are somewhat undecided as to their future action. An appeal has been made to the state highway commission to interpret the two laws, so that they may not conflict.

Chapter 578 of the Acts of 1911 reads as follows:

Every vehicle on wheels, whether stationary or in motion, on any public highway or bridge, shall have attached to it a light or lights which shall be so displayed as to be visible from the front and rear during the period of one hour after sunset to one hour before sunrise; provided, however, that this act shall not apply to any vehicle which is designed to be propelled by hand, or to any vehicle while upon any lighted street or highway where street lights are maintained at a distance of 500 feet apart or less, or to any vehicle designed for the transportation, as its principal freight, of hay or straw while loaded with such freight.

Chapter 182 of the Acts of 1914 amends this act by striking out the words, "Or to any vehicle while upon any lighted street or highway where street lights are maintained at a distance of 500 feet apart or less". This not only changes the statute so that it applies to horse drawn vehicles, but it conflicts with the wording of the motor vehicle act, which provides that motor vehicles shall display lights during a period of one-half hour after sunset to one-half hour before sunrise. It may be pointed out that the original law, Chapter 578, did not conflict in the same manner, since automobiles were required to carry lights even where street lights were maintained as stated. Police officials hold that the motoring law still applies to automobiles, and motorists are lighting their lamps one-half hour after sunset, in order to be on the safe side.

SYSTEMATIZING METHODS.

United States Government Studying Systems Employed in 100 Counties.

In an effort to determine the points of excellence or defects in existing local methods of building and maintaining roads, which will aid the state authorities in placing local road management on a systematized basis, the division of road economics of the United States Department of Agriculture has begun a study of such work in 100 counties in the various states of the Union. It is understood that the highway department heads are co-operating cordially in this work, and it is expected that satisfactory results can be accomplished in this manner.

Those in charge of the work state that this investigation has been prompted by the fact that there is at present very little knowledge as to the most effective and economical methods by which a county can develop its roads. The methods of financing local road improvements vary from calling on farmers for a certain number of days labor in lieu of a road tax, or the use of county prisoners in road construction, to bond issues or maintenance of roads from dram shop license funds. Moreover, there is no standard system of keeping accounts, and as a result among various counties with the same conditions, the cost for excavation or other labor is anything but uniform, and many counties, because of the absence of definite knowledge, fail to use local and cheap materials and construct roads which are unnecessarily expensive for the purpose, or which will wear out before the bond issues are redeemed. The investigation also will include a careful study of the use of convict labor in road construction.

BRIEF NEWS NOTES.

The Massachusetts Senate has passed the act forbidding the operation of motor vehicles of any kind in the Town of Nantucket, on the island of that name, having amended the original bill so as to provide a penalty of not less than \$10 nor more than \$100 for each offense.

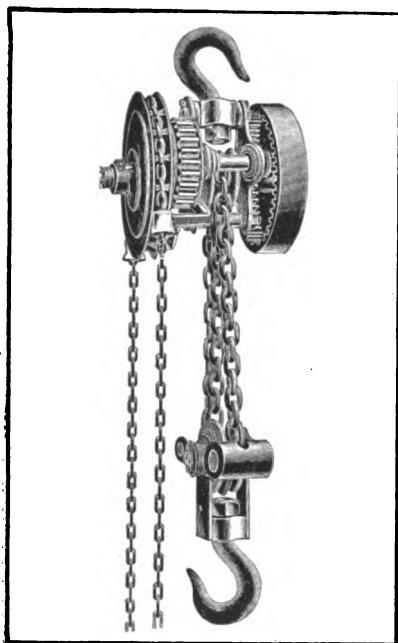
Governor Oddie of Nevada has announced his intention of appointing a good roads day for some time in June, on which work will be commenced on the Lincoln highway in that state.

Attorney-General J. C. Bell of Pennsylvania has brought a third mandamus action against Auditor-General A. W. Powell, to compel him to honor requisitions from the state highway commission in the matter of automobile fees under the act of 1913. The action is for the purpose of securing an early court decision on the constitutionality of the law on this point. The fund has now reached something over \$900,000, which, it is claimed, should be expended on highway improvements.

County Commissioner M. G. Robson of Logan county, Ohio, has unearthed an old law, prohibiting the use of the highways to vehicles of more than 4200 pounds, except they are fitted with five-inch tires. This is held to apply to motor trucks and pleasure cars.

MACHINERY, TOOLS, EQUIPMENT AND SUPPLIES.

THE need of some form of chain hoist in the garage and repair shop is more marked than formerly when the practise was to cast the



Simplex Two-Speed Chain Hoist.

motor cylinders singly and in pairs. The en bloc casting is difficult for one or two men to handle, especially if the engine is a six-cylinder unit.

J. G. Speidel, Reading, Penn., is manufacturing the Simplex chain hoist, one of the qualities of which is that it is a two-speed device, a construction saving time where the load to be lifted is of

varying weight. As will be noted by an accompanying illustration, an endless chain runs over a chain wheel, which, in connection with a pinion and a brake wheel with ratchet teeth in the outer rim, forms the automatic brake, which prevents the load from descending. These three parts, when assembled, make practically a unit construction, and turn loosely on the reduction extension of the main shaft.

The pinion attached to the hand chain wheel drives a spur gear, which is keyed to a second shaft, at the end of which is another pinion. The last named member engages with an internal spur gear, which is keyed to the opposite end of the main shaft, to which is attached the lift chain wheel. Motion is transmitted from the hand chain to the lift chain, and by pulling on the hand chain, in either direction, the load is lifted or lowered. When hoisting a load the brake wheel, with its ratchet teeth on the outer rim, rotates freely with the hand chain wheel and pinion, and without resistance, as the ratchet pawl runs freely over the teeth. When the pull on the chain wheel ceases, the pawl engages with the teeth of the ratchet on the brake wheel, preventing it from running backward, and so keeping the load suspended.

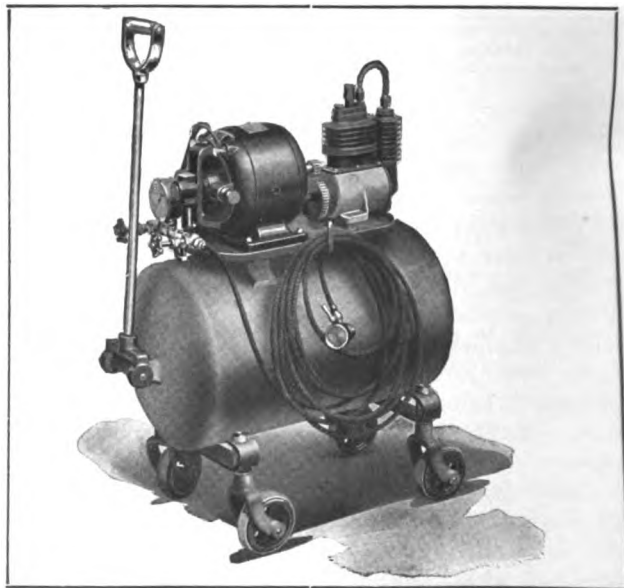
In lowering the load the hand chain is pulled in an opposite direction, and but little effort is required to overcome the friction of the automatic brake, thus permitting the load to descend and holding the same suspended again, as soon as the workman stops pulling on the hand chain. The load can be lowered at a good rate of speed by a continuous pull upon the hand chain.

By means of an ingenious arrangement of the lower block, the lift chain is locked to the chain wheel of the lower block, providing the two speeds referred to, making for economy of time in handling light loads. Closed rings attached to a swinging frame provide guides for the hand chain, enabling the operator to stand away from under a load, pulling the chain at an angle, without producing any appreciable amount of friction or wear on the chain or guide. The construction eliminates the possibility of the chain wedging between the wheels and guides. Price lists will be supplied upon request.

GEMMER-DETROIT PUMP.

Electrically Driven Garage Equipment Designed to Withstand Heavy Service.

The Gemmer-Detroit Starter Company, Detroit, which concern has announced a pneumatic starting system for motor cars, is manufacturing electrically operated pumps for the garage, and one of the types is shown in an accompanying illustration. This is a portable design.



Gemmer-Detroit Garage Pump.

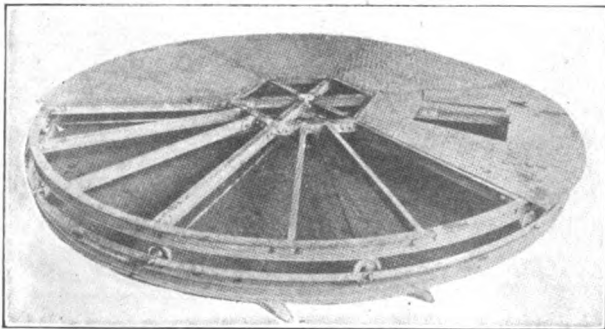
Efficiency is one of the qualities of the outfit emphasized. The pump is a four-cylinder, air-cooled unit, the cylinders having a bore of 1.5 inches and stroke of 1.75. The tank has sufficient capacity to inflate 15 34 by four-inch tires with one filling. It is stated that the pump will renew the air supply quickly, and that 175 pounds pressure can be pumped up in 20 minutes.

One of the features of the equipment is the elimination of the usual platform. The running gear is of heavy metal strips welded directly to the tank, and the rubber tired wheels are swivelled to these strips.

AMERICAN TURNTABLE.

Consists of Steel Frame and Plates and May Be Utilized as a Wash Rack.

The Minneapolis, Minn., branch of the American Bridge Company, is producing the turntable



American All-Steel Turntable.

shown herewith, which is constructed in two sizes, 14 and 15 feet respectively. The table consists of a steel frame constructed of three-inch I beam section, carrying .25-inch steel plates. The table rolls on 12 cast iron wheels, these being carried on a spider having spacing bars. The top plates of the table are perforated, permitting of its use as a washstand if desired. One plate is made removable so that inspection and lubrication are made easily.

GROETKEN PUMP.

Is of the Self-Measuring Type and Is Adaptable for a Number of Purposes.

The J. J. Groetken Pump Company, Aurora, Ill., is manufacturing a pump for the convenient and economical handling of gasoline, kerosene, oils and other liquids. It is of the self-measuring type and can be made to serve a number of

purposes. One of its qualities is that it can be employed with barrels as well as with underground systems. The construction is simple and accuracy in measuring is emphasized in the design.

The pump proper consists of two seamless brass cylinders, to which are attached an iron cap and base. The cap is made in two sections, with the lower member chambered to permit the use of a fibre gasket, into which the ends of the cylinders are seated, making a tight construction. The base is machined and chambered where joined to the cylinders to provide an absolutely tight joint. The assembly is rigidly retained by four .3125-inch bolts, and the lid of the cap is clamped to the cap with .25-inch cap screws. It is stated that the gland stuffing box utilized in this pump prevents leakage around the crankshaft. The cap of the pump forming the housing for the crankshaft, also acts as an air chamber, facilitating the flow of the liquid.

The pump head is 15 inches overall, and all pumps have one-inch standard pipe intake and .75-inch outlet. All parts are machined carefully and each pump is tested after assembly. Prices and complete details will be forwarded upon request.

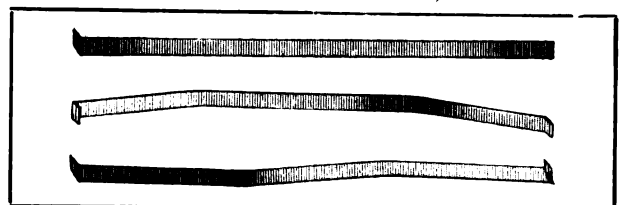


Groetken Pump.

MORGAN SCRAPERS.

A Flexible Tool with Ends Bent to Make Easy Removal of Carbon from Cylinders.

The Morgan Manufacturing Company, Newport, R. I., is marketing the Morgan carbon scrapers which come in sets of three. The tools are constructed of a high grade of steel, are flexible, and two have their ends bent to right angles and sharpened for removing deposits from the top of the cylinders or pistons. The third tool is straight, but both ends are sharpened for scraping around valves and their seats, etc

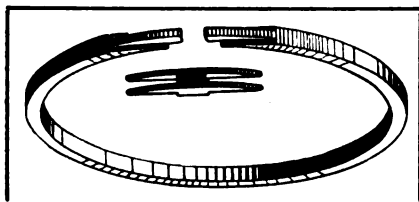


Morgan Flexible Carbon Scrapers.

BURD PISTON RINGS.

Utilizes a Bronze Coupler to Obtain a Gas Tight Construction.

R. L. Burd, 818 South Main street, Rockford, Ill., is manufacturing the Burd high compression



Burd Compression Piston Ring.

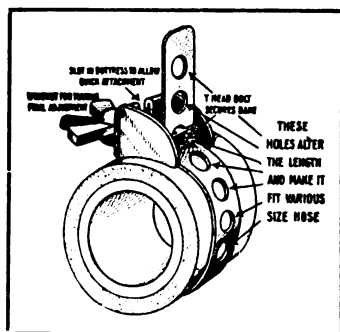
ring shown in an accompanying illustration, and the ring is shown relaxed and coupler detached, ready to be sprung over the piston. After the ring is sprung over the piston, the bronze coupler is inserted, and it is stated that the two lock together as the cylinder is slipped over the construction.

It is claimed that the design provides an equal pressure on the cylinder walls, and that the coupler seals the opening effectually, preventing the passage of oil or the mixture. The maker states that the rings have been subjected to severe tests in service and that they will considerably improve the compression of any motors, particularly old engines. The Burd rings come in standard sizes up to six inches.

MORGAN HOSE CLAMP.

Is Quickly Attached and Fits Intermediate Sizes Within Its Capacity.

The Morgan Manufacturing Company, Newport, R. I., is marketing a clamp or coupling for hose which presents several practical features, the most noticeable of which is that it will fit any intermediate sizes of pipe within its capacity. As



Morgan Hose Clamp.

will be noted by the accompanying illustration, it includes a flat band and buttress, and a slot in the latter permits of quick attachment. The band is secured by a T head bolt carrying a wing nut, and one of the qualities of the design is that no tools are necessary to adjust the clamp. As will be noted by the drawing, the band is provided with several holes for the purpose of fit-

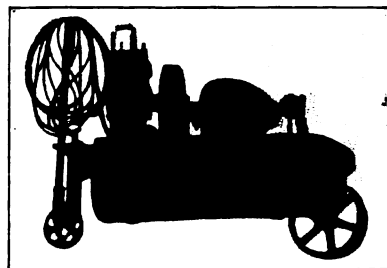
ting different sized hose. The type 10 is constructed of stamped brass with nut of similar material and the steel screw has a fine thread. The clamps come in different sizes and are inexpensive.

MASTER GARAGE PUMP.

Hartford Machine Screw Company Marketing Moderately Priced Electric Unit.

The Hartford Machine Screw Company, Hartford, Conn., is producing a line of electrically operated garage pumps, one of which, the model G, is illustrated herewith. It is provided with a storage tank mounted beneath the platform and the container has a capacity of 2300 cubic inches. It is stated that it may be pumped up to a pressure of 200 pounds a square inch in less than 10 minutes.

The motor is a standard type and the company supplies either an alternating or direct design for 110 volts, the direct listing at \$5 extra. The regular equipment includes a connection plug for the light socket, 20 feet of heavy lamp cord and 20 feet of high grade air hose



Master Electric Garage Pump Unit.

with tire pressure gauge attached. The overall dimensions are: Length, 40 inches; width, 24; height above floor, 33, and weight from 375 to 450 pounds, depending on the type of motor utilized. The platform is sturdily constructed, equipped with wheels, and a convenient handle is provided. The equipment can be moved easily about the garage or rolled out on the road when tires are to be inflated. It is stated that when thus used the tank will inflate four 37 by five-inch tires to 90 pounds pressure without starting the motor.

The company manufactures a similar but smaller type, known as model N. It is portable, but no tank is provided, the pump connecting directly to the tires. It is stated that the pump will inflate a 37 by five-inch tire to 90 pounds pressure in 2.75 minutes. The regular equipment includes 10 feet of air hose with pressure gauge attached and 20 feet of flexible lamp cord with plug connector. The overall dimensions are: Length, 28 inches; width, 16; height from floor, 18. The weight is about 100 pounds with

alternating or direct current motor, both being 110-volt. The model N is also supplied mounted on a base for stationary work. Data on garage pumps will be supplied by the company upon request.

THE CALCULAGRAPH.

Prints Elapsed and Actual Working Time in Hours and Minutes, or Fractions.

The advantages of keeping an accurate record of the time spent on each job is appreciated both by the car owner and the proprietor of a garage or repair shop. Instances of a motorist questioning the time charged to him in a repair job are not uncommon, especially if the shop is not equipped with some form of time keeping instrument or practical system.

A device that is stated to maintain an accurate record of the time spent by the workman on a job, and which prints the elapsed time or actual working time in hours and minutes or fractions of an hour, is the Calculagraph, made by the Calculagraph Company, 13 Maiden lane, New York City.

The clock is shown in an accompanying illustration and stamps on on a card the time the work is started, completed and the elapsed time. All the workman has to do is to insert a card in the clock and pull the stamping lever. When the job is completed he places the card in the clock again and the time consumed is automatically recorded.

The advantages claimed for the system are: Saves time wasted when the workman makes out his time slip, simplifies bookkeeping, as the actual time is recorded, and insures accuracy.

The calculagraph has three dials. That at the right shows the time the work is commenced

and the other two the time employed, the left indicating the hours and the centre the tenths. When the card is inserted in the machine the handle is pulled in one direction and this stamps the starting time, also the figures of the other two dials. When the job is completed the handle is moved the other way and this stamps two arrows, indicating hours and tenths on the card. Each arrow and its dial rotate together. A date printing attachment is supplied if desired.

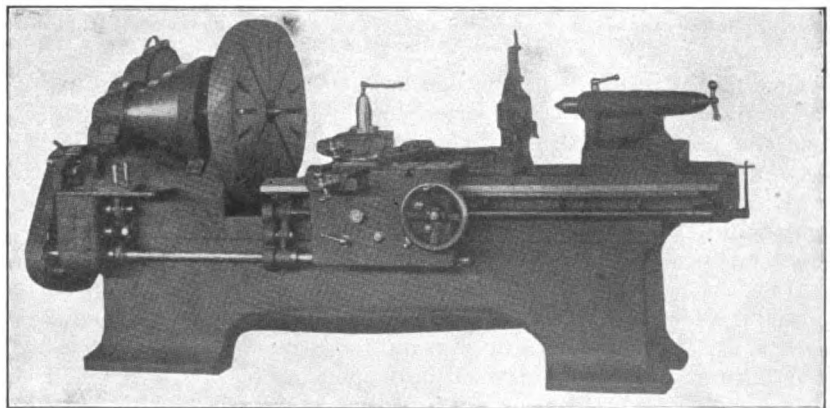
NEW BARNES LATHE.

Sliding Gap Extension Machine Adapted to a General Class of Work.

A new 22 to 36-inch sliding extension gap lathe, having a bed 102 inches long, and adapted to a general class of work in a shop where the demands are of large range, has been brought out by the Barnes Drill Company, Rockford, Ill.

The lathe will take work between centres, with the gap closed, 50 inches in length, while the gap has a maximum opening of 36 inches. The top bed, which is 24.875 inches wide, extends beyond the main bed to provide a firm support for the carriage when turning large diameter work in the gap. This is held to eliminate the necessity of an auxiliary brace.

The lathe has a cone pulley drive, with a four-step pulley. There are 12 spindle speeds, ranging from 2.3 to 400 revolutions a minute, with a countershaft speed of 200 revolutions a minute. There are six geared feeds ranging from .008 to .123 inches a revolution of the spindle. Any number of threads ranging from two to 20 can be cut. Two sets of back gears, having ratios of



Barnes New 22 to 36-inch Sliding Extension Gap Lathe.

8:1 and 44:1, respectively, are provided. The net weight of the machine is approximately 5300 pounds.

IN THE COMMERCIAL VEHICLE FIELD.

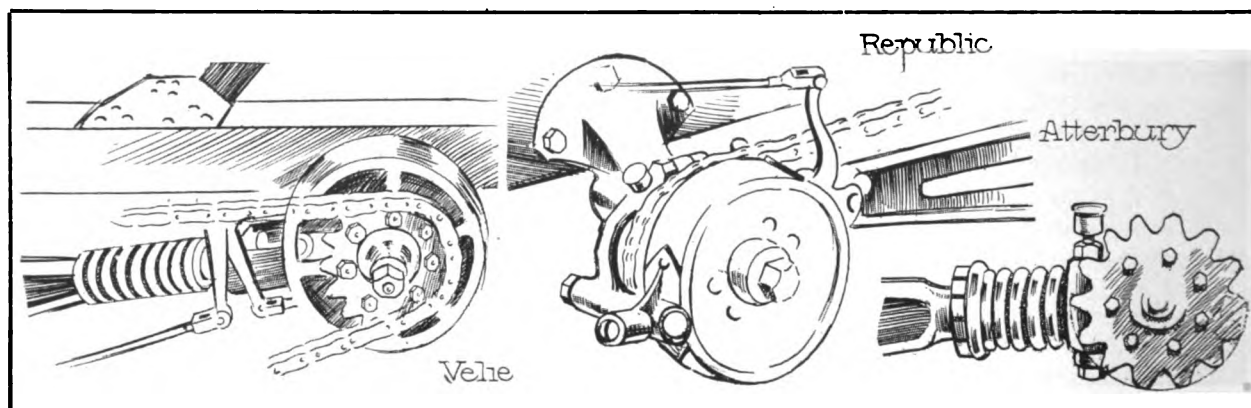
Additional Features of Design and Construction Recently Incorporated in Trucks on the American Market---New Four-Wheel Drive Machine for German Army.

TWO American trucks have radius rods designed with heavy springs incorporated with the forward sections, there being a telescoping coupling to permit the spring action, in addition to the usual provisions for compensation of vertical and horizontal movement of the back axles. The first of the designers to adopt this construction developed the Velie three-ton model, and the same feature has been utilized for the two-ton chassis.

The rods are of conventional length and construction, aside from the spring and the coupling of the two sections, being mounted on the rear axle and jackshaft hanger. The spring is helical, of square section metal, with comparatively little space between the coils. This spring surrounds the rod and the rear end is seated

heavy helical springs that have practically the same effect, being installed around a short telescoping section of the forward ends of the rods. The springs are much shorter, however, and the metal is round section, but the convolutions are close together. The design differs in that the forward section of the rod, which is carried on the jackshaft hanger, has a fixed collar, and the rear collar is threaded on the rod, back of this being a large nut with a scored edge, against which the collar is seated.

Turning the collar and the check nut will afford any adjustment of the spring, the tension being such as will permit compression whenever the shock is excessive. The coupling is such that the spring will carry all the load when fully compressed, and there is comparatively little thrust



Spring Buffer Radius Rod of Velie Three-Ton Chassis; Jackshaft Hanger on Republic One-Ton Wagon, and Spring Equipped Radius Rod on Atterbury Two-Ton Model.

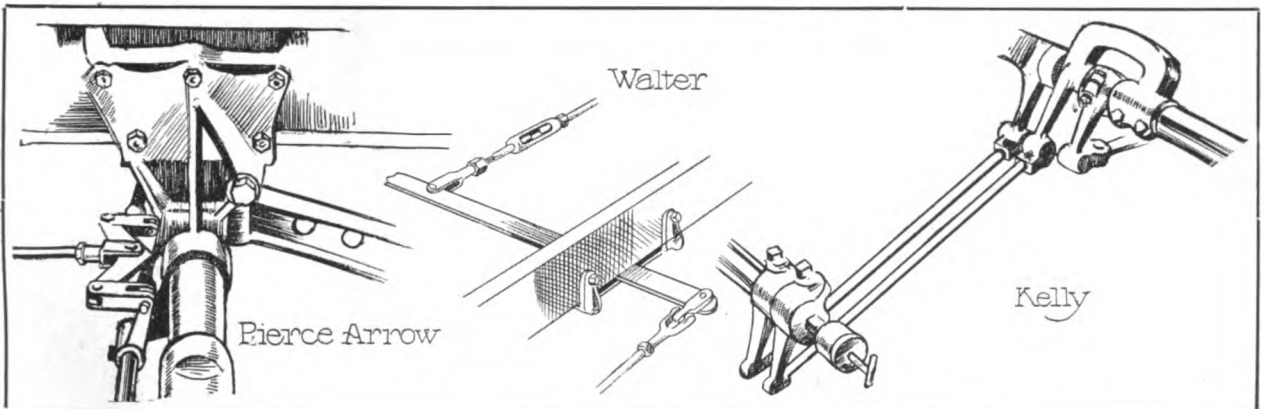
against a collar fixed on the rod. The forward end contacts with a large adjustable collar, so that the tension of the spring can be adjusted to whatever pressure is desired. The spring is of such strength that the movement is comparatively slight, but there is a sufficient cushioning effect whenever the shock is excessive, this protecting the chassis as well as lessening the strains upon the tires. The springs are long, this being necessary because of the number of the convolutions and the minimized movement under compression, and they are sufficiently back of the service brake drums to be easily accessible for any adjustment that may be desired.

The rods installed on the Atterbury chassis, from one to five tons capacity, are fitted with

directly upon the chassis frame. The springs and connections are packed with grease and protected with leather boots, so there is practically no wear upon them.

Pierce-Arrow Features.

One of the features of the Pierce-Arrow two-ton chassis is the manner of equalizing the emergency brake pressure, which is accomplished through linkage that is actuated by a direct forward pull, a yoke being linked to arms clamped to a divided shaft that is mounted in extensions of the brackets carrying the spring shackles. These brackets are connected by a tubular cross member that ties the frame and supports the forward end of the torque arm. This hanger also supports the forward ends of the radius rods.



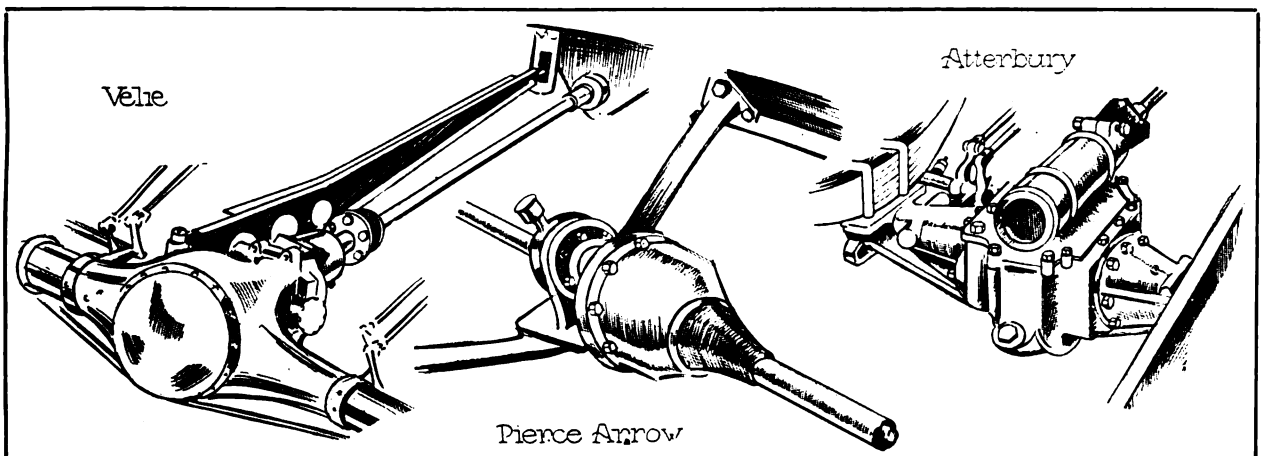
Practical Methods of Brake Linkage: Equalizer of Pierce-Arrow Two-Ton Chassis; Simple Device for Double-Acting Rear Brake on Walter, and Shaft and Sleeve Form of Brake Rod Connection on the Kelly Five-Ton Truck.

The driving shaft of this machine is supported in the centre of the frame by a cross member that is slightly dropped, and on which is mounted a self-aligning bearing of large size. Just forward of this is a universal joint that is completely housed to protect it against dust and abrasive substances. This construction is held to eliminate all side pressure and end thrust, no matter what the distortion of the chassis may be.

The rear axle of the 3000-pound Atterbury worm driven truck is somewhat out of the ordinary, in that the spring seats are of unusual length to insure against stresses from the drive through the springs, and the steel axle housing is formed of a centre and two end sections bolted together. On the centre section is bolted the mounting of the worm shaft. The end sections of the axle housing carry the brake shaft brackets, which are cast integral and machined, instead of being separate fittings. The axle is trussed to insure maximum strength.

An equalizing device that is extremely simple is that used on the Walter front drive truck, there being a rod extending back in the centre of the chassis frame. This is connected with the service brake pedal, so that pressure applied to the pedal will actuate the transmission brake, as well as the rear wheel brake, the effect being in all four wheels. The rod has a turnbuckle section and a yoke end that is pivoted on a cross bar that is slidable in guides beneath the frame side members. The ends of the cross bar are drilled for the bolts of yokes that are in turn yoked with the adjustable ends of the brake pull rods. Thus every possibility of pressure preventing the effective operation of the brake is held to be obviated. The pull rod is also so connected with the emergency brake lever that movement of this increases the pressure upon the brake shoes in the rear wheel drums, but does not affect the service brake.

The brakes of the Kelly trucks are internal



Long Skeleton Type I Section Torque Arm on Velle One-Ton Chassis; Centre Frame Member, Supporting Self-Aligning Bearing and Main Driving Shaft on Pierce-Arrow Two-Ton Model, and Sectional Rear Axle of Atterbury 3000-Pound Wagon.

expanding in the rear wheel drums, and these are operated by pull rods at either side of the chassis, within the frame. The brake shafts extend across the frame, consisting of a solid shaft and sleeve, the latter carrying a yoke that clears the rod, the longest arm forming the lever, and the shaft carries a similar lever arm. Both are connected by pull rods with lever arms mounted on short shafts and sleeves at either side of the rear axle.

Republic Service Brake.

The Republic truck service brake is installed on the jackshaft, the drums being of a conventional type, with the brake bands contracting upon them. The sprockets and the brake drums are carried on flanges on the shaft ends, and the jackshaft hangers, bolted to the frame, each has a bracket slightly in front of the drum, on which the bands are hinged. The clamping lever of the brake is pivoted at the rear on a similar bracket, and the pull rod is carried forward in a direct line and coupled with the linkage. The jackshaft

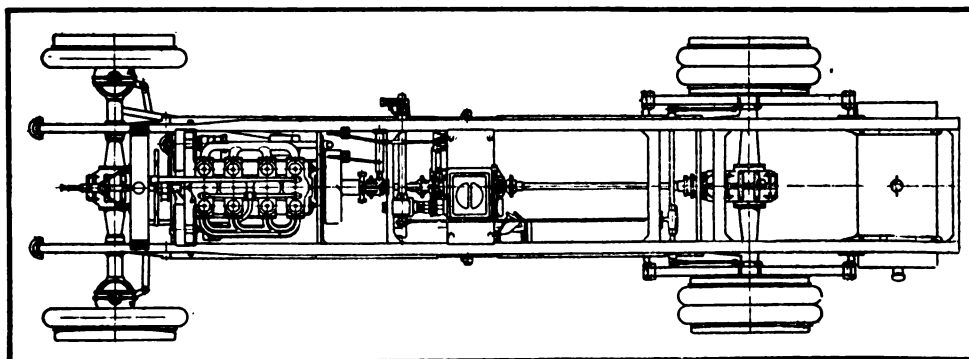
Dusseldorf. The machines furnished were equipped with guns adapted to be fired at balloons, aeroplanes, etc.

The motor is a four-cylinder unit, with bore of 130 mm and stroke of 150 mm (5.1 by 5.9 inches), rated at 50 horsepower. The two central bearings of the crankshaft are carried in the upper half of the base chamber, while the two end bearings are divided, one part being supported in the top half and the other in the lower portion of the crank chamber.

The change speed gear, which is connected to the engine through a leather faced cone clutch, is adapted to give four forward speeds and reverse. There are three shafts in the gearbox, these all being located in the same plane, one above the other. The sliding pinions are mounted on the top shaft, which is castellated for this purpose. The gears on the two lower shafts are constantly in mesh, the lowest carrying a differential gear, and also are provided with uni-

versal joints at each end, which transmit power through propeller shafts extending forward and backward to the front and rear wheels, respectively, both of the last named being driven through bevel and differential gearing.

In the front, as well as in the back axles, the live shafts



Plan View of Ehrhardt Four-Wheel Drive Chassis, Recently Delivered to the German Military Officials.

hanger also carries the forward end of the radius rod.

The Velie one-ton delivery wagon is shaft driven and the rear springs are shackled at either end. The driving and braking torque is taken by a long torque arm at the left side of the driving shaft that is pivoted on the axle housing and spring supported at the forward end. This arm is an I section, with the web at the rear end cut to reduce weight.

EHRHARDT FOUR-WHEEL DRIVE.

Some Details Concerning New Truck Supplied to German Military Authorities.

Accompanying sketches set forth the constructional details of the new Ehrhardt four-wheel drive wagon, recently supplied to the German military authorities by Heinrich Ehrhardt.

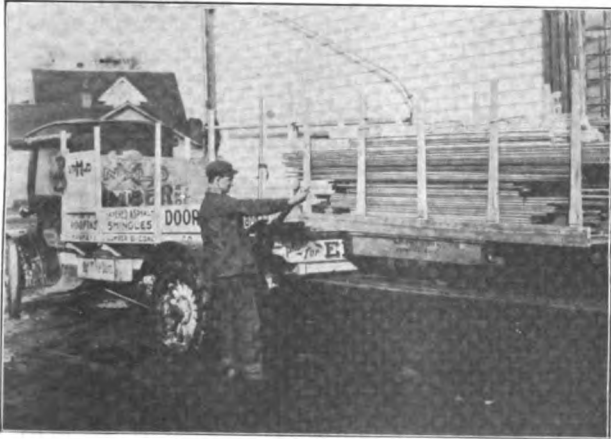
are enclosed in a casing. On the front axle, built up with the steering pivots, is a dust and grease tight casing which encloses a series of bevel pinions, enabling the drive to be transmitted to the front wheels at whatever position they may be turned under the action of the steering wheel.

The rear wheels, which are mounted on the axle casings, and receive their driving effort through dog clutches fitted to the ends of the axles, are of special type, built up of sheet steel discs and shod with twin solid rubber tires. On each side of the wheels extension rings are bolted, so that when the vehicle is travelling over soft ground, into which the tires may sink, there is a rim surface 15 inches wide, which assists in preventing loss of traction.

The capacity of the chassis is assumed to be limited to small loads, in view of the class of service for which it is intended.

QUICK LUMBER HANDLING.**Combination of Loading Crates and B. A. Gramm's Truck Minimizes Time and Labor.**

Another example of the methods that may be employed to insure efficiency and economy in



Crated Load on Hand Truck Ready for Transferring.

the use of motor vehicles is noted in the service of the Hawkeye Lumber & Coal Company, Cedar Rapids, Ia. The concern is one of the largest lumber dealers in that city, and makes deliveries covering considerable distance outside of the municipality. For this so-called long haul work it purchased a two-ton B. A. Gramm's truck, made by the Gramm-Bernstein Company, Lima, O.

It early was demonstrated that, in order to realize the maximum value of the truck, it would be necessary to secure some more efficient method of loading and unloading. As an experiment, a number of crates were built, these consisting of a stout platform with stanchions or stakes at either side. These are placed on yard hand trucks and wheeled to a loading platform, so arranged that the decks are on about the same level as the platform body of the motor truck.

The plan involves loading the hand truck in the yard or lumber sheds, and when the motor truck returns from a trip it is backed to the loading platform. The platform of the crate is dropped onto a roll set slightly above the deck of the motor truck, and by turning this roll with a hand crank the crate is drawn into place, other rolls taking the load as it advances. One man operates the crank and the loading is accomplished rapidly and with little labor.

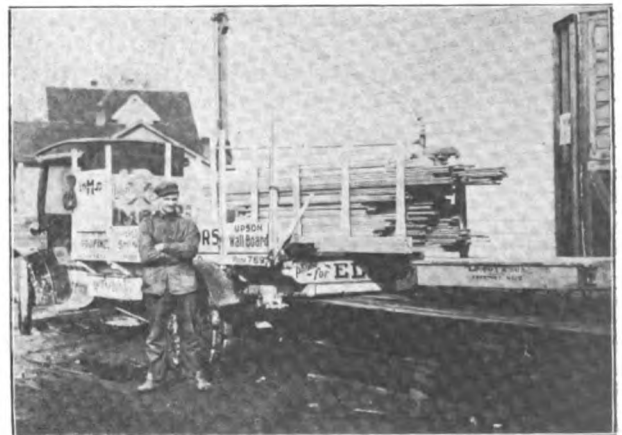
When the loaded crate has been transferred to the motor truck it is secured with a binding chain or rope. At the destination the load is un-

bound, and by reversing the movement of the rolls it is dropped to the ground. The crate is picked up at convenience or when the next load is delivered. Accompanying illustrations indicate the method of transferring the lumber when loading.

ARMY OPENS TRUCK BIDS.**War Department Will Purchase Four 1.5-Ton Trucks for Aerial Squadron.**

The War Department opened bids May 22 for four 1.5-ton trucks for service with the aerial squadron at Galveston, Tex. The specifications call for machines having an overload capacity of 20 per cent., with either two or four-wheel drive through a shaft. The motor must have four cylinders cast en bloc, water-cooled, with dual ignition and preferably with three point suspension. The clutch must be a leather faced cone. Other details include: Four-speed transmission, 120-inch wheelbase, irreversible steering, semi-elliptic springs of chrome silico-manganese steel. The vehicle must not exceed 5000 pounds in weight, empty.

The body must be three feet four inches wide, one foot nine inches deep, nine feet six inches long at the bottom and 10 feet at the top; all according to the standard army escort wagon specifications, complete with bows and canvas cover. It also must be detachable back of the driver's seat. The material must consist of white oak, reinforced with angle iron, and the floor



Lumber Completely Loaded Ready for Delivery Trip.

must be protected by four strips of wearing iron, 1.5 by .1875 inches, running lengthwise the full length of the body.

SUGGESTIONS FOR THE NEW CAR OWNER.

Attention Necessary with the New Automobile, with Special Reference to the Model T Ford---How a Selective Sliding Gearset Operates.

In response to a large number of communications from owners of small and popular priced automobiles, asking for information as to their construction, adjustment, repair and maintenance, there will be presented in this department a series of educational articles dealing with the above named subjects. Each make will be treated separately and the discussions will deal with the principles involved and their application in practise.

To maintain a motor car economically, and to prolong its usefulness, it is desirable that the owner be familiar with its construction, and when the function of each part is understood the work of making adjustments or completing repairs is not difficult. There is much satisfaction in knowing one's car. It not only enables the owner to correct minor troubles while on the road, but eliminates the repair bill due to a lack of knowledge, as well as other expense.

For the benefit of those owners not mechanically inclined, and who hold that the construction of certain components is too complicated to be mastered, the discussions will be devoid of technical terms. Each part will be taken up in logical sequence and its function clearly shown by illustrations. The serials will be concluded by practical suggestions for economical maintenance.

MODEL T FORD—PART I.

When the agent delivers the new car to the purchaser, general instructions are given as to the fuel, oil and water supply. The novice is told to keep the radiator filled with water, oil in the crankcase and gasoline in the tank, but in learning to operate the machine he generally forgets the reasons advanced by the salesman for attending to these details.

As the motor will not run unless supplied with fuel, a complete consumption of the gasoline results in no other trouble than annoyance and a replenishing of the supply. Cooling and lubrication are important and too much emphasis cannot be laid upon the necessity of providing a proper supply of both fluids, especially with a new motor, the working parts of which are more or less stiff.

Cooling the Motor.

Dealing first with the cooling system, it should be borne in mind that the explosion of the mixture in the combustion chamber of the cylinders results in considerable heat, and were not means employed to keep the temperature within certain well defined limits, the metal would become so hot that it would ignite the mixture upon its entrance into the cylinder, bringing about what is termed preignition.

Water is utilized to cool the engine, the fluid being circulated in spaces termed water jackets, and through the radiator, the last named member being utilized to cool the heated water. The

amount of water necessary is computed by the designer and it is important that any losses through evaporation or boiling be compensated for by renewing the supply. Until the operator learns to utilize the spark to advantage he is apt to rely upon the throttle, and also is prone to race the motor, all of which tends to raise the temperature of the cooling fluid, especially in warm weather.

Filling Radiator.

The radiator should be kept filled with clean, soft water, and it is good practise to completely empty the cooling system at least once a week and refill with fresh water. The use of hard water should be avoided. If the radiator is emptied, renew the supply slowly to avoid forming air pockets. If the radiator is filled to its capacity, upon the water becoming heated it will expand, causing a slight overflow through the pipe provided for this purpose, but should the fluid boil unduly, it is well to examine the radiator to note if the water is circulating. The radiator should be cooler at the bottom than at the top. As the cooling system will be taken up in detail in another article the subject may be dismissed here with the above general suggestions.

Lubrication.

The function of a lubricant is to prevent wear of the working parts and to minimize friction. It prevents actual contact of the moving parts and a good oil has capacity for storing and carrying away heat. A new car requires a greater supply of lubricant during the first 200 or 300 miles, as the bearings, etc., are more or less stiff. Provision is made for noting the supply on hand, which is stored in the flywheel housing. The last named member is provided with two petcocks, the upper denoting the level to be maintained until the motor has been operated sufficiently for all bearings to have become worked in. The lower petcock may be termed a safety level, in that under no circumstances should the supply be allowed to get below it.

Motor Lubrication.

The replenishment is made through the breather pipe. Previous to renewing the supply the upper petcock should be opened, and if oil does not flow, pour in the lubricant slowly until it does. The opening in the petcock should be kept free at all times, as it is obvious that the

motor would be flooded should the oil fail to run out of the petcock when renewing the supply. After the parts have become what is termed limbered up, the supply may be cut down, filling to a level between the two petcocks. With the new car it will be necessary to give close attention to the oil supply. A high grade, light oil is recommended by the maker.

Oil and Grease Cups.

All parts of the chassis subject to friction are provided with lubricating means, either oil or grease cups. Beginning with the power plant, there is the fan bearing to be lubricated, and it will not be amiss to oil the bearing of the starting crank shaft. The commutator should be oiled about every 200 miles and it is good practise to first clean it by injecting gasoline or kerosene to displace any particles of metal or grit.

any surplus oil to prevent the accumulation of dirt. Observe similar precautions in renewing the supply of grease in the cups provided, and when purchasing grease always insist on the best, one free from acid or corrosives. Cheap lubricants are dear at any price.

COLE TRANSMISSION.

The operation of the change speed lever is familiar to those who drive a machine having a sliding gearset, but how the different speeds are obtained is not so well known. A knowledge of the construction and operation of the gearset will be of value to the new owner, as it will explain to a certain extent why trouble is experienced in changing speeds under given conditions.

The gearset of the Cole series eight is shown

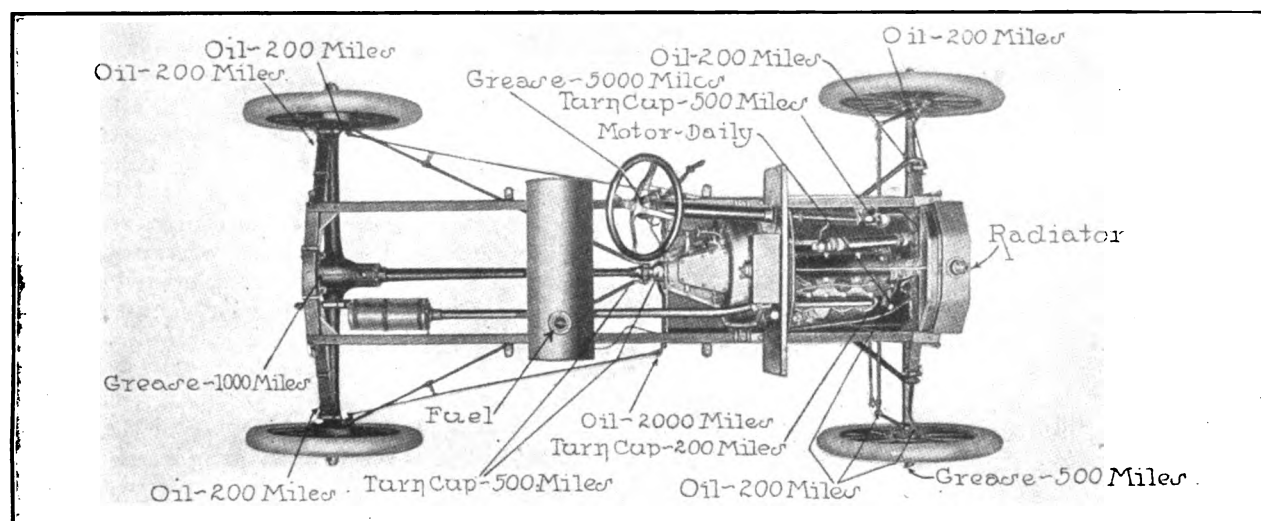


Chart of Model T Ford Chassis Showing Parts Requiring Lubrication and According to Mileage.

The transmission is lubricated by the oil poured into the reservoir. Nothing but oil should be used in the motor, as graphite or other compositions have a tendency to diminish the efficiency of the flywheel magneto.

The best method to insure proper attention to the parts requiring occasional lubrication is to tack up on the walls of the garage a lubricating chart showing the components requiring oiling and grease. The accompanying chart will be found useful, it being arranged according to the instructions of the maker of the car discussed.

Renewing Supply.

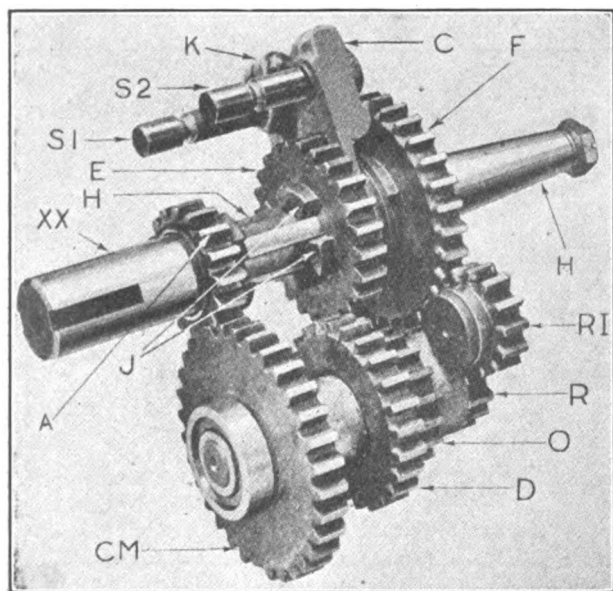
In renewing the supply of lubricant in the oil cups, it is best to first wipe the cup clean to prevent any road dust being carried by the fresh oil to the working parts. Road dust is a fine abrasive and its cutting powers are rapid. Wipe off

in an accompanying illustration as it would appear if it were to be removed from the housing, and as it is of a conventional type with its components lettered, the explanation of its operation can be followed easily.

The male member of the clutch, that part which is withdrawn from contact with the flywheel when the clutch is disengaged, slides freely on the shaft XX, yet turns with it, as there are four spines integral with the shaft, these absorbing the torque. Attached to the shaft XX is the drive pinion A, which is always in mesh with the larger gear CM, and these two are termed the constant mesh gears. Whenever the shaft XX turns, the lay or countershaft on which the gear CM is mounted, also rotates, but, as the drive pinion A is considerably smaller than the gear CM, it rotates much more slowly.

The gears CM, D, O and R, the second, low and reverse members, are practically integral with the countershaft and rotate with it. Gears E and F are sliding members. While they revolve with the mainshaft H they may be moved forward or backward, or in an axial direction, because of the splines which fit into slots in the gear hubs.

The movement of the gears E and F is accomplished by shifter forks K and C, these being attached to the shafts S1 and S2, the low and high speed shifter rods respectively. Stops are utilized to prevent the rods from moving of themselves. The plunger stops are placed in holes provided to receive them and drop into notches cut into the shifter rod at the proper point. They are pressed against the rod by



Components of Selective Sliding Gearset Lettered to Define Their Construction and Operation.

means of springs and the hole back of the spring is closed by a threaded plug.

The operation of the gearset is best explained by the progressive steps, as when changing speeds. Beginning with the first or low speed, the placing of the change speed lever into its correct slot moves the shifter rod S1 in the direction opposite to that of the arrow. The motion is transmitted through the shifter fork K to the gear F, and the latter moves forward into mesh with the gear O below it on the countershaft. Upon the clutch being engaged the energy is transmitted in the following manner:

The drive pinion A rotates the gear CM, and consequently the low speed gear O. The last named member being in mesh with the gear F the

latter is rotated, also the shaft H, which is connected to the drive shaft actuating the rear axles.

The second speed is obtained by disengaging the clutch and unmeshing the gears F and O, and sliding the gear E into mesh with D, the sliding member in this instance being moved forward. As was the case with the low speed the drive is imparted through pinion A and gears CM, D and E to the mainshaft. With both the low and second speed the mainshaft H rotates at a slower speed than the motor, thus obtaining the reduction between the engine and the mainshaft.

With the high gear or direct drive none of the transmission gears is in mesh; that is, those providing a reduction between the motor and the mainshaft. The gear E is provided with four jaw clutches J and these engage with similar members on the drive pinion A. When the sliding gear E is moved forward, these clutches mesh. The mainshaft then becomes the driving member, transmitting energy to the driving axles.

With the first, second and direct drive, the mainshaft rotates clockwise, or in the same direction as that in which the crankshaft of the motor rotates, and this holds true when either of the first and second speed gears of the countershaft is in mesh with those on the mainshaft. It will be noted that the countershaft rotates anti-clockwise. When any of its gears are in engagement with those on the mainshaft, the latter will rotate clockwise.

The reverse is obtained by rotating the mainshaft anti-clockwise. An idler gear RI is always in mesh with the gear R. The latter is secured to the countershaft and rotates with it. When the gear F is moved into engagement with the gear RI the mainshaft will turn anti-clockwise, as the drive is through the gears A, CM, R and RI to F. Gear R rotates anti-clockwise, gear RI clockwise and F anti-clockwise.

It will be observed that there is a difference in the size of the sliding gears and the fixed members, and it is this variation that is a factor in the changing of speeds. To obtain easy and noiseless engagement it is important that the speed of each be approximately the same, which requires acceleration, etc., of the motor, although the spinning of the clutch is a factor to be considered.

Several Metz cars, made by the Metz Company, Waltham, Mass., are being used by Gen. Villa and his officers in the Constitutionalist campaign in Mexico.

WILL STUDY EFFICIENCY.**Automobile Men Interested in the Formation of Detroit's Executives Club.**

Through the combined efforts of F. F. Beall of the Packard Motor Car Company, Alvin S. Knoblock of the Northway Motors Company and E. St. Elmo Lewis of the Burroughs Adding Machine Company, the Detroit Executives Club has been formed for the purpose of studying and preaching efficiency in all branches of manufacturing and retail business in that city. The club is composed of members of the Detroit Board of Commerce, and its active membership is limited to 50. Boyd Fisher, formerly associated with the Efficiency Society of New York, has been engaged temporarily to devote his entire time to the work which will be carried on.

The by-laws provide for a small, compact working, efficiency organization. The object is set forth as follows: "To propagate a wider knowledge of the principles of efficiency and such other subjects as may be determined upon by the executive committee. The first two activities of the club will be confined to: First, a thorough survey of the firms in Detroit that are studying and applying principles of efficiency in the operation of their business, and second, an exhaustive study of the subject of profit sharing plans which have been adopted by various industrial and business enterprises, not only in this country, but in Europe.

PHILIPPINE IMPORTS.**Those of Automobiles and Accessories Have Shown a Remarkable Increase.**

Imports of automobiles and accessories into the Philippine Islands have shown a greater increase in recent years than probably any other commodity, in spite of the rather straightened financial circumstances which have been prevalent during the past two years, according to G. C. Bristol, manager of the foreign department of the Motz Tire & Rubber Company, Akron, O.

In the fiscal year of 1911 there were imported 429 automobiles, valued at \$567,177, and in 1913 this had increased to 624 cars, valued at \$886,710. Imports of accessories increased in value from \$147,597 in 1911 to \$271,237 in 1913. Of the last named amount, \$180,823 was represented by the value of tires imported.

Mr. Bristol states that his company's shipments to the Philippine Islands have increased

tenfold during the past two years, and that the Bachrach Garage & Taxicab Company of Manila, distributor for Motz cushion tires in the Orient, reports the trade for 1914 promises considerable additional business.

CHALMERS' NEW YORK PLANS.**New Factory Branch Will Become Distributing House for Entire Eastern District.**

Some little interest attaches to the plans of the Chalmers Motor Company, Detroit, in purchasing the business of Carl H. Page Company of New York City and establishing the Chalmers Motor Company of New York in its place. The sale was announced in these columns recently, and the actual transfer of the property was consummated this month.

The new concern is to be a direct factory branch, and, while it will continue to act as the local retail representative of the company, it also becomes the general wholesale distributing house for the entire eastern district, embracing New England, the Middle Atlantic and Southern Atlantic States. George Stowe, who has been associated with Carl H. Page in directing the affairs of the old company, has been appointed branch manager.

NAME SPECIAL COMMITTEES.**Automobile Engineers in New York City Seek Information on Timely Topics.**

As a means of gathering timely information on a number of important topics, the Metropolitan section, Society of Automobile Engineers, New York City, has organized a number of special research committees. The plan has been devised in order to shed new light on questions to which a great deal of attention is being directed, but which involve complications that are considered a hindrance to progress. The following list of committees indicates the character of the problems selected thus far:

Gas-Electric Vehicles—David Beecroft, William P. Kennedy, Lars G. Nilson.

Kerosene Carburetors—A. B. Browne, W. Rautenstrauch, Joseph Tracy, Roger B. Whitman.

Greases—H. M. Martin, George K. Bradfield, W. F. Parish, L. P. Prossen.

Non-Electric Continuous Torque Transmission—L. M. Dietrich, Morris Machol, John R. Cautley.

Engine Characteristics—James L. Breese, Lloyd G. Busby, Robert McA. Lloyd, Finley R. Porter, W. M. Power.

Governors—Arthur J. Slade, C. W. Fletcher, H. G. McComb.

RACING EVENTS AND OTHER CONTESTS.

Metz Company Is Barred from Defending Its Title to Glidden Trophy by Rules Adopted for 1914 Tour—Hill Climb Result in the South—Notes and News.

THE Metz Company, Waltham, Mass., may be pardoned for asking a reconsideration of the rules laid down by the American Automobile Association for this year's Glidden tour. It will be remembered that this classic trophy—one of the most famous in the history of the industry in this country or abroad—is now held by that concern, having been won with a team of three Metz cars in the national reliability tour from Minneapolis to Glacier Park, Mont., in 1913.

The rules governing this year's contest were published in the last issue of The Automobile Journal. They provide that the Glidden trophy shall be the award in the class for cars selling at over \$1200. Since the Metz car lists for \$475, it is obvious that the present holder will be unable to defend the honor, unless the regulations are changed.

The Metz car is not entirely excluded from the contest, since it is eligible for the class confined to cars selling at less than \$1200, for which the award is the A. A. A. trophy. It might also compete as a privately owned machine, in the division for which the Anderson trophy is the award. But, as the rules now exist, it will be impossible for the Metz to retain the Glidden trophy after July 2.

VANDERBILT AND GRAND PRIZE.

Will Be Held Two Weeks Apart During Panama-Pacific Exposition in 1915.

It is understood that the contest board of the American Automobile Association has awarded a sanction to the Panama-Pacific Exposition for holding the ninth race for the Vanderbilt cup and the sixth contest for the Grand Prize. The former events also will be sanctioned by American Automobile Club, and both by the Motor Cups Holding Association, of which W. K. Vanderbilt, Jr., is president.

The races will be held some time in the spring, the exact date to be determined later. They will be held two weeks apart, the Vanderbilt Cup event coming first. The details will be arranged by a special racing committee composed of: W. L. Hughson of the firm of Hughson & Martin, well known in Pacific automobile

circles, chairman; H. P. Scott, Union Iron Works; M. H. Young, San Francisco Chronicle; R. A. Crothers, San Francisco Bulletin, and H. E. Cooley, chief of special events.

RESULTS AT ATLANTA.

Marmon Takes the Feature Event and Studebaker Captures Two Cups.

A Marmon car, owned by Dr. Frank Edmonson, and driven by W. T. Edgar, took the feature event, the free-for-all, in the Stewart Hill climb of the Atlanta Automobile & Accessories Association, Atlanta, Ga., May 9. By winning in the 451-600 inches class for the third consecutive time, L. C. Crane took permanent possession of the A. A. & A. A. cup with a Pope-Hartford. The summary follows:

161-230 Inches. (Georgian-American Cup.)		
Car	Driver	Time
Studebaker.....	Odum	1:04.2
Studebaker.....	Rooney	1:12.0
231-300 Inches. (Journal Trophy.)		
Studebaker.....	Cohen	0:58.0
Studebaker.....	McCune	1:00.0
Ford.....	Alexander	1:11.6
301-450 Inches. (Constitution Cup.)		
Stearns.....	McKinstry	1:05.0
Overland.....	Boyers	1:12.8
Pope-Hartford.....		1:16.4
451-600 Inches. (A. A. & A. A. Cup.)		
Pope-Hartford.....	Crane	0:51.4
National.....	McKerrall	0:52.0
Free-for-All.		
Marmon.....	Edgar	0:47.4
Pope-Hartford.....	Crane	0:50.2
National.....	McKerrall	0:51.0

IOWA'S LITTLE GLIDDEN.

Tourists Will Leave Des Moines in Time to See Races at Sioux City Track.

The Iowa Little Glidden tour will be held this year under the auspices of the Iowa State Automobile Association and the direction of Earl E. Butler of Des Moines, chairman of the contest committee of the Polk County Automobile Club. It will be a combination sociability and reliability run, leaving Des Moines, July 1, with the intention of reaching Sioux City in time for the 300-mile race, July 4.

The first day's run will be to Mason City and Clear lake, the night being spent on the shores of that body of water. The second night will find the tourists at Spirit lake, while Storm lake will be the noon control the third day. After witnessing the race the party will leave Sioux City the morning of July 5, going to Council Bluffs and Omaha. The last day will take the tourists back to Des Moines over popular routes.

STUTZ A DOUBLE WINNER.

Car Bearing That Name Takes Both the Junior Vanderbilt Cup and Grand Prize.

Alexander Pabst of Los Angeles, 15 years of age, recently piloted a Stutz car, an exact replica of the white car in which Earl Cooper rode to fame on the Coast in 1913, insofar as outer appearance was concerned, in both the Junior Vanderbilt Cup and Grand Prize races on the one-mile Ascot park track in that city. The former event was for 15 miles, which were covered in 27:47, and the latter for 25 miles, Pabst's time being 34 minutes flat.

The car is shown in an accompanying illustration, and it may be described briefly, as follows: Wheelbase, 60 inches; tread, 36; tires, 20 by four-inch (aeroplane type); motor, Flying Merkel, twin-cylinder, air-cooled, rated at six horsepower; drive, V belt; steering gear, spindle and flexible wire.

In his description of the race, the owner of the car, Walter M. Brown, general manager of the Walter M. Brown Company, Los Angeles agent for the Stutz, made by the Stutz Motor Car Company, Indianapolis, Ind., and backer of Earl Cooper, says:

The little No. 8 is some car, and little Alex Pabst is some driver. He made a Garrison finish in the Vanderbilt Cup event, coming from behind in the 13th lap and passing the pacemaker, when the latter's car lost an engine bolt and was forced to stop. The following day, when the Grand Prize was run, Alex went out after a record—and got it. He was not forced to stop once, and defeated 12 of the speediest "foreign and American" cars. There were no mechanical adjustments, the motor ran perfectly, no water was taken on during the race and the radiator was absolutely cool after the 25 miles were covered.

Because of lack of entries, the two-day track meet of the Columbus Automobile Club, Columbus, O., scheduled for May 17-18, was abandoned.

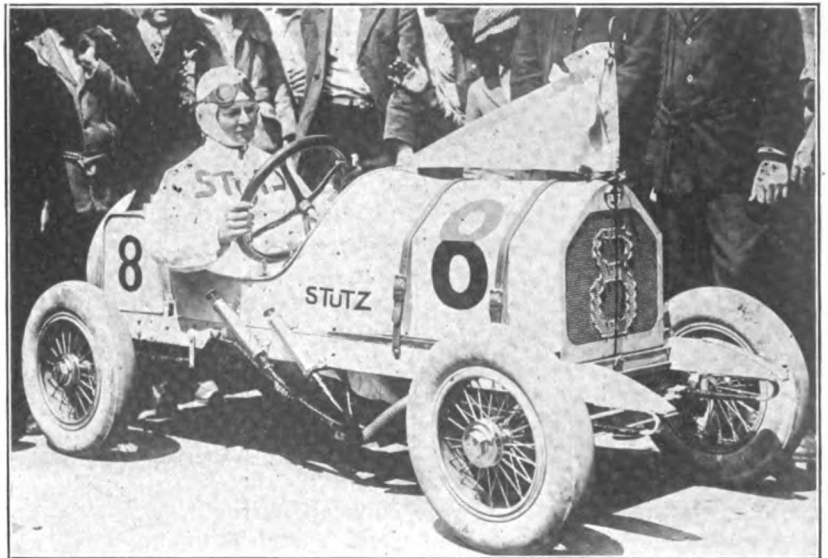
RACING NOTES AND NEWS.

The automobile dealers in Sioux City, Ia., have raised a purse of \$50,000 for the inaugural race meet on the new speedway. The feature event will be the 300-mile race, July 4, but it is now proposed to add other events to be held June 30.

Heavy rains caused a postponement of the Colorado-Texas tour, which was to have started from Colorado Springs, May 4. On account of the fact that several bridges in Texas had been washed out, it was decided that the time was inopportune for such an event.

H. E. Deneger, Asbury Park, N. J., is responsible for a novel zone system in connection with the runs to that city, May 29-30. The first zone will comprise New York City and Long Island; second, Hudson and Essex counties in New Jersey; third, Middlesex county; fourth, Mercer county; fifth, Camden county and Philadelphia. Separate prizes will be awarded to motorists residing in each of these zones.

In the recent secret time run of the Quaker City Motor Club of Philadelphia, to Atlantic City, N. J., the first award was made to George D. Wright, driving a Chevrolet car. As in past years, the "secret time" was determined by averaging the elapsed time of the several con-



Alexander Pabst and His Miniature Stutz with Which He Won the Junior Vanderbilt Cup and Grand Prize Races.

testants. This resulted in 6:24:45. The Chevrolet's time was 6:22:10. William Oliver, at the wheel of a Mercer, took second prize, his time being 6:20:40. Ralph D. Earle in a Moline was third, with 6:19:43. Miss Erma Hardart took the ladies' cup.

J. B. Giquel, representative of the White Company, Cleveland, O., in Havana, Cuba, reports that a White car driven by Raul Monocal won the recent race held in that city under the auspices of the dealers of Havana. The entries included three Whites, and three each of two other American makes and of seven foreign cars. The winner received a large silver cup, and each of the drivers taking part in the event received as their compensation the car which he drove in the race.

The contest board of the American Automobile Association has adopted a new form of stock car certificate for non-speed events. Under the head of motor are listed the following: Number of cylinders, how cast, bore, stroke, displacement and valve location. The carburetion, ignition, lubrication, lighting, starting, cooling and transmission systems are covered in their important particulars, as well as tires, accessory equipment and bodies.

B. R. C. DYNAUTO HAS NOVEL FEATURES.

AMONG the more recent electric lighting systems brought out abroad is the B. R. C. Dynauto, marketed by Fenestre, Cadisch & Co.,

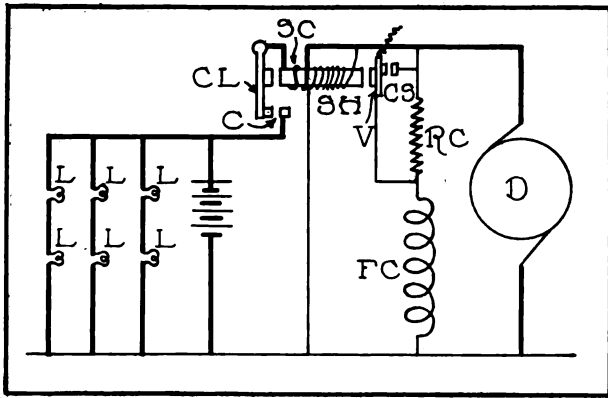


Fig. 1—Wiring Diagram of the B. R. C. Lighting System, Having Several Interesting Features, Including Control of Voltage.

London. It employs an ingenious principle and is termed a constant voltage dynamo, in that at all speeds above a certain minimum limit the voltage is constant for a given load. This should not be read too literally, as it does not necessarily follow that the voltage of the dynamo is the same when the lamps are not burning or extinguished, or the same when the battery is partially or fully charged.

To understand the principle involved an explanation of the simplified wiring diagram presented at Fig. 1 will be of service. In this diagram F C represents the coils around the field magnets of the dynamo. These coils are wired in shunt with the main circuit, and it will be noted that the field coils are in series with the resistance coil R C. At the left of the last named construction will be noted the shunt coil S H, which is wound around the iron core of the automatic cut-out, which also carries a short series coil S C, which when the contacts C are closed, forms a part of the completed main circuit.

At the other end of the cut-out core is a vibrator blade V provided with a tungsten or iridium contact point which normally makes contact with the contact screw C S, thereby providing a passage of low resistance for the current that passes through the field coils F C. This passage is alternative to the one provided through the resistance coil R C.

Upon the dynamo speeding up the core of the cut-out becomes sufficiently magnetized to attract the cut-out lever C L, making a contact between the two points and completing the main

circuit. The current then flows around the series coil S C to the battery and the lamps L. Upon the dynamo attaining a speed at which the current flowing around the shunt coil S H is sufficiently strong to attract the vibrator blade V, the contact between the points is broken. When this takes place the current through the field magnet coils is prevented from flowing by the easiest possible path, and must pass through the resistance coil R C.

This reduces the strength of the field current, which in turn tends to reduce the output of the dynamo. The output being slightly reduced the current flowing through the shunt coil is no longer strong enough to hold the vibrator blade V in contact with the other point, and it moves back again, making contact at C S, allowing the current to flow by the easiest path. These operations are repeated very rapidly so long as the output of the dynamo is above that at which the movement of the vibrator blade begins. It will be noted that the current flowing through the coil S H has nothing to do with that flowing through the main circuit, but is dependent entirely upon the voltage across the terminals of the dynamo. The control of output for any given load is that of voltage, not of current.

It is pointed out that if the dynamo control had no connection with the current flowing through the main circuit there would be certain disadvantages in the system. Among these would be the difficulty of charging the battery to its capacity, and to charge the cells at a proper rate when they were more or less exhausted. This is held to be overcome by the utilization of the se-

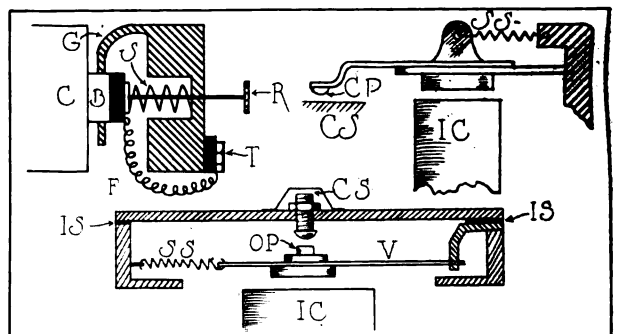


Fig. 2—Components of B. R. C. Dynamo: At Left, Arrangement of Brush Gear; at Right, Diagram of Automatic Cut-Out; Lower, Diagram of Voltage Regulator.

ries coil S C, previously referred to.

When a strong current begins to flow, as, for example, when the battery is in a discharged

condition, this coil is stated to be more effective in assisting the coil S H than it would be were the cells nearly fully charged. The two coils working in conjunction actuate the vibrator V much sooner than the coil S H would have done if acting alone, and so, by reducing the voltage permitted across the field coils, reduce the strength of the current in the main circuit, preventing too strong a current flowing to the battery. The presence of the series coil S C must mean a slight variation in the voltage at the dynamo terminals according to the number of lamps that are burning. With the battery disconnected it is evident that any increase in the number of lamps tends to reduce somewhat the voltage at their terminals.

The field magnets are cylindrical and carry two pole pieces, and the commutator of the armature is constructed with the insulating strips exactly flush with the copper segments. Provision is made for easy disassembly of the dynamo and the inspection of components.

The automatic cut-out and voltage regulating device are carried under the end cover of the machine. The brushes are wide and shallow, and current is taken from them through flexible connections to the dynamo terminals. The arrangement of the brush gear is shown in the upper left hand view at Fig. 2, the components being lettered as follows: B, brush; C, commutator; F, flexible connections to terminals; G, brush holder; R, rod which can be drawn back to facilitate removal; T, S, spring holding brush in position on commutator terminal.

An end view of the machine is shown at Fig. 3. It will be noted that the fuse is placed at the right and is retained by a strong clip of copper. Above it is the voltage regulator, separated by the wound cut-out core mechanism on the left. The cut-out lever is controlled by a spiral spring S S, shown at Fig. 2, and carries at its end a semi-cylindrical contact piece C P which, when the cut-out armature core is pulled up towards the core, presses on a flat brass contact surface C S. The cut-out mechanism may be displaced readily by loosening two nuts on the bolts, the further ends of which are pivoted.

The voltage controller mechanism shown in the lower part of Fig. 2 is equally accessible. The vibrator blade V is held by a short spring S S, the tension of which is very carefully regulated, so that the mechanism will operate at the required voltage. The blade carries a contact point O P made of tungsten, and facing this point is a contact screw C S provided with similar metal. This screw is adjusted by the maker and sealed

by a light cover to prevent tampering with its setting.

Three dynamos are produced, the No. 1 having a rated output of 80 watts; the No. 2, 100 watts, and the No. 3, 150 watts. The drive generally employed is a V belt, the ratio being 2:1 in the case of the No. 1 machine and 3:1 in the larger model, which is supplied when current is desired for operating lights and devices other than the headlights, tail and side lamps. The No. 2 is constructed for fitting under the hood and is driven at engine speed.

A single wire system is utilized; that is, the return to the dynamo is through the frame of the car. It is stated that the voltage of the Dynauto is so steady that the battery could be dispensed with, although it is recommended for a source of current supply when the motor is not operating. The switchboard employed is very

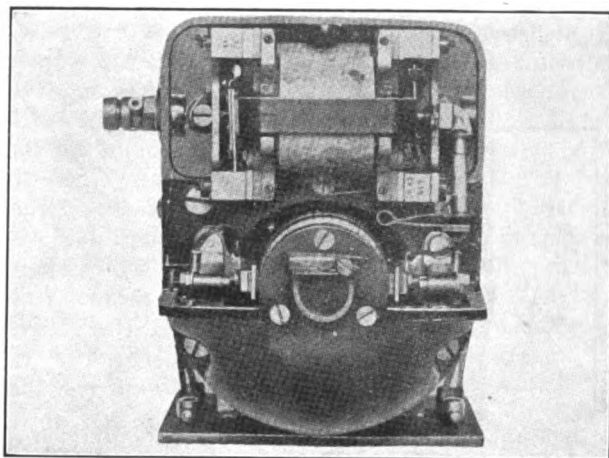


Fig. 3—End View of B. R. C. Dynamo, Showing Location of Voltage Regulator and Automatic Cut-Out.

neat and compact, and the battery is smaller than that generally utilized with lighting systems.

An instance of the enthusiastic manner in which Canada is purchasing automobiles is afforded by the standing order of the Breen Motor Car Company, Winnipeg, Manitoba, which receives each day a complete car load of Studebaker cars from the Canadian factory of the Studebaker Corporation, which is located at Walkerville, Ontario.

During the 26 working days of April the Hupp Motor Car Company, Detroit, averaged more than 90 Hupmobiles a day. The record shipping day of the month was the 30th, when 120 machines left the factory.

MECHANICAL NOTES FOR OWNERS.

Suggestions for Constructing and Fitting Storm Front to Old Machines—Removing and Replacing Universal Quick Detachable Rims.

THE modern motor car comes to the purchaser completely equipped and the buyer of a new machine is not compelled to spend several hundred dollars for a top, windshield, headlights, etc., as was formerly the case several years ago. There are, however, hundreds of old models in service today, which are not equipped with windshields, and some do not even have a storm front to protect the passengers in the front seat in rainy weather.

A suggestion for a storm front is made in the Carriage Monthly, and, while the design is for a commercial vehicle, the plan could be utilized for a pleasure car. These storm fronts are generally made of the same material as the top is trimmed with, and made loose; that is, made to

knob all around, so that they can be taken off when not in use.

To make a storm front curtain, cut a piece of the goods the size required to fit on the job. First divide the space on top curve for five fasteners and mark them

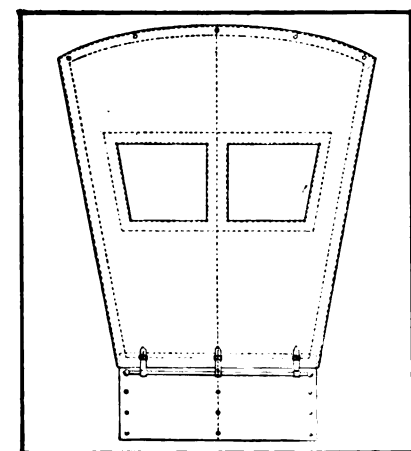


Fig. 1—Storm Front for an Old Car.

with chalk where they are to be placed. Mark the centre on goods and tack temporarily to centre of curve, then drive tacks through goods up to chalk marks for fasteners. Next tack the goods to the dash, driving four tacks through the goods to the dash, spaced equally two inches below the top.

Mark goods and dash where the fasteners should be placed, also on the curtain. Mark where the celluloid window should be, and be careful to have it in the right place. When all is marked remove the goods and make up the curtains. Cut two inches from tack holes where the fasteners are; at top and bottom mark so that the curtain will be even with outside of dash when finished. Turn a hem and sew on the

machine. Put on fasteners, using a brass turn button fastener on top of bow, and buckle and strap on the bottom of the curtain, the buckle and strap finish allowing more play for the possible sagging of the top. When all this is done the celluloid is put in the curtain.

The best and quickest way to place the celluloid is first to sew a one by a .5-inch piece of goods in the centre of the celluloid and sew around the outside edge; then turn the curtain over and cut out the centre of the goods, allowing enough so as to have .5-inch turn down all around. Sew down on the machine, and the front is ready to put on the machine. The fasteners can be placed on the job, when the tack holes are made, while fitting it.

Q. D. UNIVERSAL RIMS.

It is surprising the number of owners who employ a hammer and other heavy tools in removing and replacing a tire. This is not necessary with the modern rims, for force is not needed unless the rims have become rusty or "frozen". In the majority of instances noted by the writer the motorist failed to make an easy removal and replacement because of a lack of knowledge of the rim construction.

The quick detachable or Standard Universal No. 2, such as fitted to the Overland cars, may be manipulated easily with no other tool than a screw driver. With this design the tire is retained by two side flanges, the outer member locking the inner against the shoe.

To displace these rings, remove the dust and valve cap, and push the valve stem up as far as it will go, being careful not to injure the threads. Turn the wheel until the valve stem is at the top, as shown as Fig. 2 A, insert the end of the screw driver blade under the rounded end of the split locking ring as shown, and pry it outward. The ring can then be removed easily, provided it is not rusted. Undue force should not be employed as the ring may be sprung, making replacement more or less troublesome. The other end of the ring is retained in position by a stud meshing in a hole in the rim proper. The inner ring should slide off easily.

Examine the rims and if rusty clean and

graphite as has been suggested in this department. After replacing the shoe and inner ring it is only necessary to push these as far back

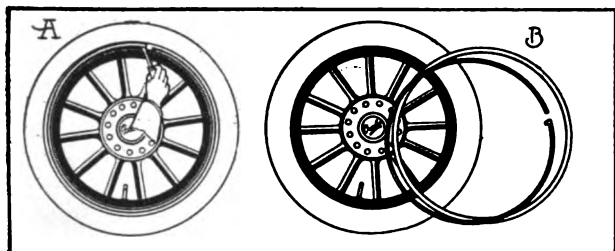


Fig. 2—Displacing Q. D. Universal Rings: A, Removing Split Locking Ring; B, Showing the Inner and Outer Rings.

as they will go to fit the locking ring. First insert the stud in its hole and work the rim in from this point all the way around. It will not be necessary to utilize a hammer if these instructions are carried out.

The quick detachable rims used on the Overland model 79 differ in that a single locking ring is utilized and it has a latch lever. A screw driver is the only tool needed to remove it. The first step is to release the latch lever. When in position it is as shown at Fig. 3 A. Insert the blade of the screw driver between the lever and base of the rim, and pull up on the screw driver, releasing the lever lug from the hole in the rim. Swing the lever outward until it is at right angles with the rim as indicated at B, releasing the locking mechanism.

To remove the ring to permit of displacing a casing, insert the screw driver in the notch at the base of the detachable ring as shown at C, pushing downward on the handle of the screw driver, prying the ring from its groove. It will then be an easy matter to remove the ring with the fingers. To replace the ring the steps are reversed.

PAINTING HINTS.

Some owners paint their cars, and the writer has seen several jobs which, although not bearing the earmarks of the expert, were very good indeed. Of course, it is not to be expected that the varnish work will be perfect, for the flowing and wiping up of varnish requires considerable experience, as well as suitable conditions for performing the work.

The common practise is to paint the running gear of a motor car and touch up and varnish the body. Many owners have an idea that the varnish is utilized to obtain a smooth appearance, to beautify the car as it were, but this is not

wholly true. Varnish is used as a protector of the colors, just as a top is employed to keep the passengers dry in rainy weather.

When a good, reliable varnish employed in the touch up and varnish job is applied to a car, other things being equal, the cost of repainting may be postponed for some time and the wear of the original paint prolonged. Motorists who formerly owned carriages have, as a rule, obtained through the experience, the knowledge necessary to know when their machine needs touching up and varnishing. Some make it a practise to have this work done every spring. It makes for economy, as the novice will learn when he compares the cost of a burn off job with that of retouching and varnishing.

Ordinarily the amateur painter makes the error of not properly cleaning the car, especially the chassis. The cost of painting a motor vehicle is, as a rule, in excess of that of a carriage because of the extra labor involved in cleaning. And when the car is an old one, the chassis is covered with grease and oil soaked road dust, all of which must be entirely removed before any attempt is made at touching up, let alone varnishing.

Ordinarily the body does not give much trouble and the foreign elements may be removed by vigorous rubbing with turpentine and pumice stone flour. The surface will then need merely rubbing fine and uniform all over, sufficiently to take away the gloss and remove the sediment of gases and scum certain to affect the varnish.

The work of cleaning the chassis is much more difficult. Some form of scraping knife, such as a putty or case knife, or other sharp instrument will be necessary to peel the cement like collections of oil, grease and road dust. Removers utilized for this work comprise mixtures of two parts crude oil and one part turpentine,

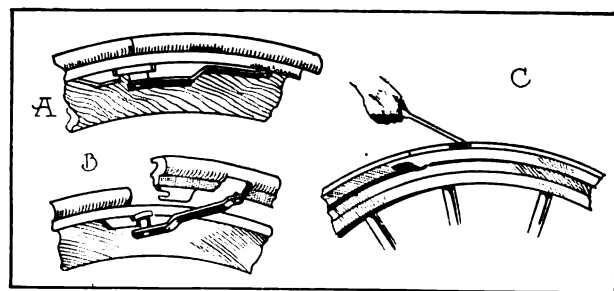


Fig. 3—Rims Used on Overland Model 79 Cars: A, Locking Lever in Normal Position; B, Same Open; C, Using Screw Driver to Start Detachable Ring.

equal parts denatured alcohol and turpentine, and also sal soda and caustic soda, the last named being a very powerful alkali. After the motorist

has completed the work of cleaning the chassis—that is, properly—he will understand why it costs more to prepare and paint a motor car than a horse drawn vehicle.

In connection with this work it should be stated that all traces of lubricant must be removed from crevices, else the result of the completed work will be very disappointing. The cleaning cannot be slighted in the least. It is very important.

Gouges or surface bruises will require attention. They should be well cleaned out, then touched up with some half lead and pigment colored to match the field color. Next plug the cavities with common, hard drying putty, and smooth it level with the surface. The putty should be allowed to dry over night, then faced down with a block of rubbing stone dipped in turpentine. The next step is to match some color with that which had been used on the car.

The matching of color is, in the opinion of the writer, a difficult task, and it will bother the expert to match some faded and bleached colors. Because of this it will be well for the owner-painter to use the color sparingly in retouching and as thin as possible consistent with proper covering power. Touch only the defect, and avoid daubing. For small spots employ a swan quill lettering pencil. Make the touch-up with a varnish gloss, and give all colors plenty of time to dry perfectly before attempting to varnish. Some colors, notably greens, have a tendency to show off-color shades if varnished before they are thoroughly dry.

The final step is varnishing, and in selecting the material use none but the best, a varnish especially adapted for the work. Cheap varnish is a waste of time. It should be flowed on full, and have ample depth.

ADJUSTING BULBS.

A maker of electric lighting equipment recommends the following for adjusting the focus of headlights: To focus the lamps, open the swinging front of the lamp and direct the light upon some smooth vertical surface at a distance of about 10 feet. Loosen the adjusting screw on the slide at the rear of the reflector, and move the bulb and socket out or in until all rings disappear in the illuminated area. Then tighten the adjusting screw and close the lamp. Any further adjustment of the lamp must be made by bending the arms of the lamp bracket with a heavy wrench until the light of each lamp strikes the road at the point desired.

CARE OF ALL-METAL WHEELS.

All-metal wheels, such as were fitted to the two-cylinder Autocar runabout for example, require inspection from time to time. The construction is not solid, and the thickness of the felloe is such that if allowed to rust there is, in time, danger of the metal becoming weakened.

The rust should be removed with sandpaper and the surface thoroughly cleaned. Next prepare a mixture of shellac and powdered graphite, using as much of the latter as possible. Paint the cleaned surface and allow the coat to dry hard before replacing the tire. If the shellac treatment is not favored, use plenty of graphite mixed with enough oil to form a thick paste.

SECONDARY CABLES.

The attention of readers has been called to the importance of renewing the secondary wiring whenever it is suspected of being faulty, especially on old machines where more or less lubricant escapes from the working parts of the motor. Cables that have seen considerable service, and which have been exposed to heat, may be the cause of missing at low speeds or a baffling, intermittent miss. Certain types of secondary cable are more or less susceptible to oil, and when the insulation has become swelled, it is best to throw away the wire and purchase new.

PHYSICAL EXAMINATION PAYS.

Plan Adopted by Goodyear Tire & Rubber Company Results in Greater Efficiency.

Excellent results are said to have been realized by the Goodyear Tire & Rubber Company, Akron, O., from a system inaugurated Jan. 1, under which every prospective employee is submitted to a physical examination. This is given as one of the reasons why the Goodyear plant, now employing about 7500 men, a number not much larger than the number employed last year, is producing double the product turned out in 1913.

The examination itself is not so formidable as it sounds, and the presence of various ailments revealed by it does not necessarily bar candidates from employment by the company. On the other hand, the information thus obtained enables the placing of the men where they will be the most efficient and where they can work with minimum discomfort and secure maximum returns for themselves.

TO REBUILD OLD CASINGS.

Motor Tire Reconstruction Company Organized Under New Jersey Statute.

The Motor Tire Reconstruction Company has been incorporated under New Jersey laws, with capital of \$250,000. Offices have been established in New York City, and it is stated that the business of the concern will be that of rebuilding worn-out casings, in contradistinction to the usual practise of retreading them.

The process is said to be the invention of I. S. McGhiehan, who is interested in the manufacture of Mogul tires, and to be practically the same as that used by that concern. It is planned to establish agencies in practically every city and town of consequence in the country, and to supply full equipment and a license to use the process within a particular district.

ANOTHER ORDER OF SALE.

Only One Bid Made for Property of the Walpole Tire & Rubber Company.

At the contemplated sale of the property of the Walpole Tire & Rubber Company, Walpole, Mass., scheduled for May 11, only one bid, of \$800,000, was filed, and the sale was declared off by Judge Dodge of the United States district court. This bid was made by C. G. Metzler, representing the stockholders' reorganization committee, and was far below the upset price of \$1,500,000 fixed by the court in ordering the property sold. The receivers have been instructed to draft another order for sale.

The property has been in the hands of Robert O. Harris and Robert C. Fisher, receivers, since last summer. It is stated that they have been running the business at a profit of \$20,000 a month. They are understood to have \$170,000 on hand at present, from which it is expected that a second dividend will be paid shortly. The first dividend was one of four per cent.

TAILOR MADE BODIES.

Maker of the Marmon Finds an Increasing Demand for Distinctive Coach Work.

That there seems to have been a decided change during the past two years in the demands of the owners of high priced cars, is the statement made by F. E. Moskovics, commercial manager of the Nordyke & Marmon Company,

Indianapolis, Ind., maker of the Marmon line. He adds that they no longer purchase a machine simply on its price and past reputation, and no longer like their car "ready made", so to speak, but insist that their coach work be distinctly "tailor made", or different from their neighbors.

Mr. Moskovics asserts that this demand has become so insistent that the company makes nearly every job a special order to meet the requirements of customers, and as a result of this policy it is doing a tremendous business. He finds, as well, that the demand is not confined to the so-called smart set, but includes a large number of people of good taste and refinement, who dislike to ride in machines that look as if they were all cut out of the same pattern.

OAKLAND MAINTENANCE COST.

Tennessee Owners Report 2.41 Cents a Mile, Which Company Says Is Not Unusual.

The question of maintenance cost, or the expense of running an automobile, is one which interests many motorists and prospective car owners. In a recent letter to the Oakland Motor Car Company, Pontiac, Mich., M. C. Jansen, Jr., of Nashville, Tenn., states that he operated his Oakland machine 53,000 miles last year at a cost of 2.41 cents a mile his itemized statement being as follows:

Gasoline .....	.0150
Oil, including transmission and cup grease.....	.0024
Washing and polishing.....	.0052
Extras .....	.0015
Total.....	.0241

The extras included the following: Three dollars for a dash light, \$2.50 for a tool box to put on the step, \$1.50 for two headlight globes and \$1.50 for a wire connection on the dash so that he would not be compelled to pump the tires by hand. Mr. Jansen explains that he was at no expense for repairs, and made no attempt to achieve a low expense record. Officials of the company state that less than 2.5 cents a mile is nothing unusual for a normal year's service with an Oakland car in the hands of an average owner.

According to H. R. Radford, vice president and general manager of the Cartercar Company, Pontiac, Mich., one of the company's model 7 Cartercars recently hauled three freighting wagons, loaded with lumber, the combined weight of which was over 12 tons, in the streets of Douglas, Ariz. The car itself also contained five passengers.

NEWS OF THE MANUFACTURER AND DEALER.

The following concerns have been incorporated recently to manufacture or deal in motor vehicles, accessories, etc.:

Camden Auto Company, Camden, Me.; \$5000; to deal in automobiles, etc.

Champion Motor Car Company, Wilmington, Del.; \$100,000; to deal in automobiles.

Mutual Motor Service Company, Dover, Del.; \$22,500; to manufacture automobiles, power boats, etc.

China Vehicle Company, Ltd., Portland, Me.; to manufacture motor vehicles of all kinds.

Shea's Market, Lake Placid, N. Y.; \$50,000; to deal in automobiles, etc.; H. D. Hayford and others.

J. N. Johns Manufacturing Company, New York City; \$25,000; to deal in motor vehicles.

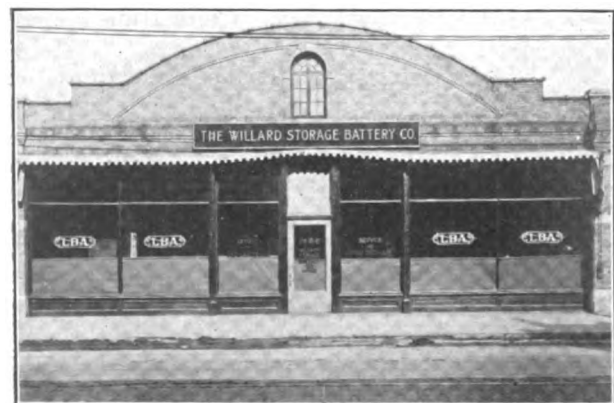
Emme, Young & Co., New York City; \$25,000; to deal in aeroplanes, sporting goods, yachts, etc.; H. D. Emme, F. C. Young, E. Day.

Barter & Longtin, Watertown, N. Y.; \$5000; to deal in automobiles and motorcycles.

Union Automobile Service Company, Detroit, Mich.; \$4000; to deal in automobiles.

Milwaukee Garage Company, Milwaukee, Wis.; \$3000; to conduct a garage.

Lotus Garage Company, New York City; \$10,000; to conduct a garage and repair shop; A. Larney and others.



Willard Storage Battery Company's Detroit Branch.

Empire Electric Vehicle Company, Wilmington, Del.; \$200,000; to deal in automobiles.

Lake Auto Company, Raleigh, N. C.; \$25,000; to deal in automobiles, etc.

Lincoln Rubber Company, Akron, O.; \$10,000; to manufacture rubber goods; J. Hadfield, I. Hadfield, W. E. Slabaugh, M. Siberling, S. A. Allen.

Central Automobile Company, Alexandria, Va.; \$1000; to deal in automobiles; W. H. Heymel, J. A. Eggborn.

Lipman Air Appliance Company, Beloit, Wis.; \$100,000; to manufacture air compressors; C. E. Ernst, E. K. Lipman and others.

Americo-Syrian Petroleum Company, Bristow, Okla.; \$25,000; to deal in oils; K. Wasaff, J. G. Adamie, J. Abraham.

Braun-Hoff Electrical Company, Canal Dover, O.; \$50,000; to manufacture motors and electrical apparatus; W. A. Braun, J. D. Baker, S. L. Holmes, C. E. Krieter, O. A. Keyser.

United States Air Compressor Company, Cleveland, O.; \$25,000; to manufacture air compressing machinery; R. L. Buchar, G. A. Hunter, W. G. Smith, W. W. Beauman, L. H. Bacher.

Herreshoff Light Car Company, Mechanicsville, N. Y.; \$100,000; to manufacture cars; C. E. Herreshoff, N. R. Holmes, A. L. Johnson.

Duryea International Motor Corporation, New York City; \$50,000; H. S. Owen, B. Thomas, W. R. Root.

Rubber Tire Accessories Company, New York City; \$10,000; to deal in tires, etc.; O. Eahart, T. J. Nugent, S. K. Ellenbogen.

George Smith Plumbing & Auto Metal Company, Springfield, Mass.; \$50,000; J. J. Moynihan, George Smith, M. H. Smith.

Prawapum Tire & Repair Company, White Plains, N. Y.; \$1000; R. J. Rennie, N. M. Gidley, J. J. Hayde, Nellie M. Gidley.

John Dickens Company, North Paterson, N. J.; to deal in automobiles; Anna Dickens, John Dickens, Ellen Farley.

Burrows Cyclecar Company, Ripley, N. Y.; to manufacture cyclecars; J. Watson Burrows, Robert P. Burrows, Robert Burrows.

Globe Ball Bearing Company, New York City; \$50,000; to manufacture ball bearings and other metal devices; George W. Carroll, Charles F. Bultemeyer, Ralph Royall.

Consumers' Gasoline Supply Company, Dover, Del.; \$250,000; to manufacture and sell lubricating oils and grease of all kinds; William Boyd, W. I. N. Lofland, W. F. P. Lofland.

Fred G. Rinker Auto Company, Indianapolis, Ind.; \$1500; to deal in automobiles; Fred G. Rinker, Charles V. Kinney, Charles F. Redding.

Automobile Accessories Company, Buffalo, N. Y.; \$25,000; to deal in automobile accessories; A. B. Floyd, W. H. Linford, T. R. Thomas.

Kelvin Electric Company, New York City; \$25,000; to deal in electrical apparatus and supplies; C. McMillan, S. Popper, K. Tikios.

Dunbar & Co., New York City; \$200,000; to deal in rubber goods, etc.; G. W. Utter, A. T. Gibbs, F. W. Dunbar.

Jaeger Engine Company, Taunton, Mass.; \$150,000; to manufacture automobile engines; C. J. Jaeger, W. R. Davenport, C. S. Day.

Taxis & Motors, Ltd., Montreal, Can.; \$200,000; J. A. Ducharme, E. Halley, C. Migeron, F. Beslere, A. Deschenes.

Crafton Garage & Supply Company, Crafton, Penn.; \$10,000; to conduct a garage; J. I. Andrews, C. E. Golden, James R. Redman, John Cramer, F. E. Miller.

Dallas Motor 'Bus Company, Dallas, Tex.; \$25,000; Ralph Robertson, R. E. Taylor, W. M. Smith.

Graham Automobile Company, Chicago, Ill.; \$2500; to deal in automobiles; Charles E. Graham, A. S. Robertson, N. J. Shupe.

WITH THE MANUFACTURERS.

The Willard Storage Battery Company's Detroit branch, shown in an accompanying illustration, is located at 736-740 Woodward avenue, and is only one of the branches and service stations maintained by the company. The front portion of the building is occupied by the general offices and private office of Manager M. G. Hillman, the charging room and service station being in the rear. The shipping and receiving departments are sufficiently extensive to admit the entrance of two or three large trucks at a time.

The Kelly Springfield Motor Truck Company, Springfield, O., recently closed a contract for 104 five-ton trucks and one two-ton truck for the Pacific Motor Coach Company, Los Angeles, Cal., which it claims constitutes the largest sale of motor driven vehicles direct to the consumer ever consummated. The order is said to represent \$500,000.

The Maxwell Motor Company, Detroit, is now prepared to furnish repair parts for the two-cylinder cars formerly made by the Maxwell-Briscoe Company, from its parts plant at Newcastle, Ind.

The Emil Grossman Manufacturing Company, Inc., Brooklyn, N. Y., has been licensed under the Hammond patent, No. 1,086,820, dated Feb. 10, 1914, to manufacture the Holdfast battery connector. The company is the first and thus far the only manufacturer to be licensed under this patent.

The Keller Pneumatic Tool Company, Fond du Lac, Wis., which was organized recently, has commenced the manufacture of a line of compressed air tools of all kinds and will make a specialty of garage and repair shop devices.

The General Motors Truck Company, Pontiac, Mich., has just completed additions to its equipment, having

installed a 100,000-gallon reservoir as an added protection against fire. A number of cement floors also have been put in the factory.

The Milwaukee Cyclecar Company, Milwaukee, Wis., manufacturer of the Billiken cyclecars, has elected the following officers: President, Stanley H. Eigel; vice president, Samuel P. Carroll; secretary and treasurer, Fred W. Bollow. Mr. Carroll is also chief engineer.

The Hudson Motor Car Company, Detroit, announces the shipment of the new five-passenger light six model to its dealers.

The Bosch Magneto Company, New York City, states that the 12-cylinder Sunbeam car which covered the half-mile at the Brooklands track, England, on March 18 last, in 0:15.03, averaging 119.6 miles an hour, and which covered the mile in 29.82 seconds, averaging 120.73 mph, was equipped with a Bosch magneto.

The Paige-Detroit Motor Car Company, Detroit, shipped 1227 Paige cars from the loading platform shown in the accompanying illustration during the month of April. The snap shot, from which this reproduction was made, shows only a portion of one day's shipment. The company is celebrating its recent removal to its new factory by doing four times the business in one month that was done during the whole of its first season three years ago.

The Hillard Clutch & Machinery Company, Elmira, N. Y., manufacturer of multiple disc clutches for automobiles, has taken over the business of the Elmira Pattern Works.

The Woods Motor Vehicle Company, Chicago, Ill., announces that it has opened a large and elaborate salesroom at Michigan avenue and Peck court, one block south of the Blackstone hotel. The factory showrooms of the company are located at 25th street, Calumet and Cottage Grove avenues.

The Reo Motor Car Company, Lansing, Mich., reports the production of 65 cars daily. Last year at this time 40 cars was the limit of production, but additions to the plant and increased factory facilities have resulted as above.

The Apple Auto Top Company, Miamisburg, O., contemplates the erection of a large factory on Smith street. The structure will be two stories in height and 250 feet in length. The company manufactures automobile tops and casings.

The Herreshoff Light Car Company, Troy, N. Y., has been incorporated and will manufacture a small four-cylinder, water-cooled car, which it expects to be in a position to deliver in quantity by July 1.

Dodge Bros., Detroit, manufacturer of pleasure cars and accessories, has awarded contracts for the construction of a four-story reinforced concrete factory building to be used mainly as a woodworking shop. It is stated that the new car to be produced by this company will sell for less than \$600.

The Consolidated Rubber Company, Ltd., Regina, Sask., is erecting a warehouse on Broad street north.

The Fulton-Walker Company, Philadelphia, designer and builder of automobile bodies and business wagons, and the oldest wagon building firm in the city, is now completely established in its new factory at 337-45 South 12th street. An elaborate office and showroom are included among the many prominent features of the new building.

Gray & Davis, Inc., Boston, Mass., has reduced its factory time schedule from 52 hours a week to 50. In addition to increasing the time the men have to themselves, the new schedule also provides for added remuneration for overtime work and therefore does not in any way involve a reduction in wages.

GARAGE AND DEALER.

The Henderson Motor Company, Chicago, Ill., will be known as the Kloeber Motor Company in the future.

Barry & Mathias, Algonia, Ill., has dissolved partnership. Mr. Mathias will operate the business hereafter.

William McVittie, Niagara Falls, N. Y., has purchased property on Main street and will build a modern garage. He handles the Cole cars.

The Joseph W. Woodell Company, Pittsburg, Penn., has opened a new garage at 205 Wood street. The company carries automobile accessories and supplies.

The Hudson Machine Repair Shop, West Hoboken, N. J., has opened a modern garage and repair shop at 601 Summit avenue.

Irvin T. Donohoe, Washington, D. C., has taken possession of the new automobile supply store at 830 14th street. He carries a full line of automobile accessories and supplies.

The Grand Rapids Republic Truck Sales Company, Grand Rapids, Mich., has opened new quarters at the corner of Michigan street.

The Consolidated Fuel & Lumber Company, Marquette, Mich., has secured the agency for the Pruden steel portable garage.

John L. Guerlin, North Brook, Mass., has opened an up-to-date garage at Lake Quabog.

N. W. McDonald, Elizabeth, Penn., is to erect a large addition to his garage on Second avenue.

The L. S. Lord Company, Cleveland, O., has moved to 6010 Euclid avenue. The company carries Monogram oils and deals in automobile specialties.

The Syracuse Buick Sales Company, Syracuse, N. Y., will remove its garage to South Salina street. A new building is being erected for the company at 840 South State street and will be ready for occupancy Sept. 1.

The Porter-Cable Machine Company, Syracuse, N. Y., has installed a repair department and service station. The company is located at East Water street.

The Aber Schults Automobile Supply Company, Austin, Tex., is now located in its new home at 105 West Fifth street.

The Tacoma Auto Exchange, Tacoma, Wash., has been formed by P. Smith, formerly with the Studebaker Motor Car Agency.

Wald Herrick, Duxbury, Mass., is erecting an up-to-



A Portion of One Day's Shipment of Paige Cars from the New Factory in Detroit.

date garage on the state road, near Bailey's corner. New machinery will be installed.

G. Marvel, Danbury, Conn., has erected a public garage on his property at 9 Franklin street.

Burdge Bros., Middletown, N. J., has opened a new garage at Locust Point. It is modern throughout.

The New York Service Depot of the Philadelphia Storage Battery Company has yielded to the demands of a growing business and moved to larger quarters at 651-655 West 43rd street, New York City. The company occupies the entire ground floor. The plant has been considerably enlarged and is modernly equipped. It is devoted exclusively to the construction, repair, recharging and sale of storage batteries and supplies. Walter L. Thompson is in charge, with offices at 1789 Broadway.

The Sears-Cross Company, New York City, announces the removal of its service station to 218 West 65th street. The company's executive offices are now located at the factory, 147 41st street, New York City.

The Dayton Rubber Manufacturing Company, Dayton, O., has moved its New York City branch to 1851 Broadway, and now has one of the most attractive and up-to-date tire offices in that city. The company manufactures Dayton airless and Dayton pneumatic tires.

The Peerless Motor Car Company of St. Louis, Mo., has a large room set aside as a chauffeur's clubroom which is fitted with telephones, piano, pool tables and a bath.

RECENT PATENTS.

Wheel, Lycurgus Anderson, Lake Creek, Tex.; No. 1,096,817. Filed Jan. 26, 1914.

Changeable Tread for Automobiles, Eli O. Anderson, Glenwood, Fla.; No. 1,096,818. Filed Aug. 15, 1913.

Internal Combustion Engine, Gustav A. F. Ahlberg, Racine, Wis.; No. 1,096,819. Filed Jan. 9, 1913.

Valve Mechanism for Air Compressors, Hugh V. Conrad, Pittsburg, Penn., assignor to the Westinghouse Air Brake Company, same city; No. 1,096,828. Filed Dec. 19, 1910.

Tire, George Kelly, Hinsdale, Ill.; No. 1,096,842. Filed June 25, 1912.

Universal Joint Coupling, Allen Loomis, Detroit, Mich., assignor to Packard Motor Car Company, same city; No. 1,096,850. Filed June 29, 1911.

Magneto Ignition Apparatus, John Lewis Milton, Chicago, Ill.; No. 1,096,853. Filed July 15, 1908.

Rotary Engine, Charles A. Rhoades, Pampa, Tex.; No. 1,096,862. Filed July 27, 1912.

Valve Mechanism, Guido Fornaca, Turin, Italy; No. 1,096,900. Filed Dec. 17, 1912.

Motor Fuel Supplying Apparatus, Alfred Freschl and John Lyon Freschl, Chicago, Ill.; No. 1,096,901. Filed April 18, 1912.

Lubrication for Engines, Arthur Constantin Krebs, Paris, France, assignor to Societe Anonyme des Anciens Etablissements Panhard & Lavassor, same city; No. 1,096,924. Filed March 17, 1913.

Spring Suspension, Geoffrey Hamilton Norman, Blackheath, England; No. 1,096,938. Filed Jan. 18, 1913.

Running Gear, Winfield Scott Proskey, Reno, Nev.; No. 1,096,947. Filed Oct. 28, 1909.

Internal Combustion Engine, William John Robb and Walter Henry Welch, Bristol, England, assignors to Banner Motors, Ltd., same city; No. 1,096,952. Filed Oct. 7, 1912.

Pneumatic Spring Wheel, Albert O. Schoelch, Shelbyville, Ind.; No. 1,096,959. Filed Jan. 31, 1914.

Explosive Engine, Frederic S. Thornley, Clarion, Ia.; No. 1,096,968. Filed Sept. 11, 1912.

Muffler, Otto C. Unke and William H. Unke, Milwaukee, Wis.; No. 1,096,970. Filed July 30, 1913.

Carburetor, William A. Bentley, Chicago, Ill.; No. 1,096,989. Filed March 10, 1913.

Internal Combustion Engine, Herbert T. Herr, Denver, Col.; No. 1,097,021. Filed May 14, 1908.

Internal Combustion Engine, Delbert E. Lane, Chicago, Ill.; No. 1,097,032. Filed May 7, 1913.

Carburetor, Jesse F. Miller, Albany, N. Y.; No. 1,097,039. Filed Sept. 21, 1911.

Motor Tractor, Henry T. Preble, Berkeley, Cal.; No. 1,097,044. Filed Nov. 13, 1912.

Frictional Shock Absorber, Fridolin Schimmel, Faribault, Minn.; No. 1,097,050. Filed Oct. 30, 1911.

Combined Internal Combustion and Hot Air Engine, William J. Wright, Franklin, Penn., assignor to Wright Engine Company, Pittsburg, Penn.; No. 1,097,068. Filed April 3, 1911.

Clutch Lock, Frank H. Coon, Minneapolis, Minn.; No. 1,097,081. Filed Dec. 19, 1913.

Dirigible Lamp, Sidney Mills Freeborn, San Antonio, Tex.; No. 1,097,087. Filed Aug. 12, 1913.

Spring Wheel, Carl Lauritis Henreck Wraae and James Liddell, Cuba, Wis.; No. 1,097,114. Filed Nov. 1, 1912.

Nut Lock, Charles P. Dyer, Somerville, Mass., assignor to Mariner S. Fickett, Chelsea, Mass.; No. 1,097,121. Filed Sept. 26, 1912.

Rotary Aerial Engine, Louis Vallez, Lille, France; No. 1,097,150. Filed Aug. 9, 1912.

Spray Carburetor, Max Bucherer, Cologne, Germany; No. 1,097,165. Filed July 8, 1913.

Internal Combustion Engine, Fred D. Calkins and Alfred C. Johnson, Sunnyvale, Cal.; No. 1,097,166. Filed Jan. 30, 1913.

Top Frame, James W. Schnabel, Johnstown, Penn., assignor to one-half to Charles F. Schnabel, same city; No. 1,097,192. Filed Oct. 18, 1913.

Shock Absorber, David C. Shaw and James F. McGilivray, South Chicago, Ill.; No. 1,097,194. Filed Jan. 31, 1914.

Gearing, Donald M. Ferguson, Detroit, Mich.; No. 1,097,217. Filed Oct. 18, 1913.

Nut Lock, Frank W. Newton, Danville, O., assignor to one-half to Robert G. Baker and one-fourth to William Wagner, same city; No. 1,097,257. Filed Jan. 2, 1913.

Motor Truck, Francis M. Platt, Stuart, Fla.; No. 1,097,261. Filed Aug. 29, 1913.

Shock Absorber, John Baker, Jr., Los Angeles, Cal., assignor to one-half to Walter P. Shaw, same city; No. 1,097,286. Filed June 12, 1913.

Engine, William S. Harley, Milwaukee, Wis.; No. 1,097,315. Filed July 7, 1913.

Shock Absorber, William O. Olson, Chicago, Ill.; No. 1,097,353. Filed April 14, 1913.

Control Mechanism for Electric, Frederick G. Peck, Buffalo, N. Y., assignor, by mesne assignments, to Buffalo Electric Vehicle Company, same city; No. 1,097,358. Filed Oct. 16, 1909.

Spring Clip, William H. Smith, Los Angeles, Cal.; No. 1,097,370. Filed April 22, 1913.

Spring Clamp, Charles A. Boreham, Coalinga, Cal.; No. 1,097,386. Filed March 10, 1913.

Jet Carburetor, Peter Donndorf, Stuttgart, Germany, assignor to Daimler-Motoren-Gesellschaft, Unterturkheim, Germany; No. 1,097,401. Filed Feb. 11, 1913.

Motor Starter, Eugene Fuller, Providence, R. I.; No. 1,097,419. Filed Sept. 24, 1910.

Wheel, Frederick Joseph Hadfield, Ringsfield, Beccles, England; No. 1,097,427. Filed Jan. 8, 1914.

Separable Rim, Henry Brinner Kelper, Lancaster, Penn.; No. 1,097,444. Filed Aug. 30, 1913.

Brake, Thomas E. Linfoot, Flint, Mich.; No. 1,097,451. Filed Nov. 24, 1913.

COMING EVENTS.

May.

May 30—500-mile race, Indianapolis, Ind.

May 30—Track meet, New York City.

May 30—Track races, Providence, R. I.

May 30—Track meet, Washington, D. C.

June.

June 1—Coupe Florio race, Palermo, Italy.

June 1—Reliability run, Philadelphia, Penn.

June 4—Orphans' Outing, New York City.

June 6-7—Track meet, St. Louis, Mo.

June 10-11—Isle of Man road race.

June 17-18—Hill climb, Uniontown, Penn.

June 19—Track meet, Boston, Mass.

June 23-26—S. A. E. midsummer meeting, Cape May, N. J.

June 24-26—Meeting National Gas Engine Association, Chicago, Ill.

June 25—Track meet, Portland, Wash.

June 27—Race meet, Brooklands track, Weybridge, England.

June 30—Track races, Sioux City, Ia.

July.

July 1-3—Non-stop run, Chicago-Boston, for Glidden trophy.

July 3-4—Mid-summer meeting, American Automobile Association, Bretton Woods, N. H.

July 3-4—Road races, Tacoma, Wash.

July 4—Track races, Providence, R. I.

July 4—300-mile race, Sioux City, Ia.

July 4—Grand Prix, Lyons, France.

July 17-18—Speedway meet, Seattle, Wash.

July 25-26—Grand Prix, Belgium.

August.

Aug. 21-22—Road races, Elgin, Ill.

Aug. 27—Race meet, Brooklands track, Weybridge, England.

September.

Sept. 5—Track races, Milwaukee, Wis.

Sept. 7—Track races, Providence, R. I.

Sept. 9—Speedway races, Pomona, Cal.

Sept. 9—Road races, Corona, Cal.

Sept. 9—Grand Prix, Italy.

Sept. 14—Track meet, Milwaukee, Wis.

Sept. 26—Race meet, Brooklands track, Weybridge, England.

Sept. 26-Oct. 6—Show, Berlin, Germany.

October.

Oct. 1—Kerosene motor competition, Paris, France.

Oct. 2-3—Track meet, Oklahoma City, Okla.

Oct. 2-3—Track meet, Trenton, N. J.

Oct. 9—Speedway races, Chicago, Ill.

Oct. 16-26—Automobile Salon, Paris.

Oct. 17-24—Show, Pittsburg, Penn.

Oct. 19-26—American road congress, Atlanta, Ga.

November.

Nov. 6-16—Olympia show, London.

Nov. 8-11—Track meet, Shreveport, La.

PASSES 10,000 MARK.**Goodyear Tire & Rubber Company Celebrates Notable Date in Its History.**

One day early in the month the people of Akron, O., were somewhat surprised to hear 10 sharp blasts from the factory whistle of the Goodyear Tire & Rubber Company. Investigation revealed that the company was celebrating the fact that for the first time in its history the daily production of pneumatic tire casings had passed the 10,000 mark. The exact figure was 10,635.

Only a few years ago, at a meeting of Goodyear officials, President Seiberling made the enthusiastic prediction that "one of these days" Goodyear would be making 500 tires a day. He and his assistants, at that time, believed this to be a mark well worth striving for. Now, statisticians at the factory have figured out that one week's production, if piled on top of each other, would make a stack of tires higher than Pikes Peak.

CHICAGO TRADE BODY.**Important Work That Has Been Undertaken by Automobile and Accessory Dealers.**

The Chicago Automobile Trade Association, Chicago, Ill., was organized in 1907, and its membership is composed of the leading automobile and accessory dealers of that city. Headquarters are maintained at 2430 Michigan avenue, these being open daily from 8:30 in the morning to 6 in the afternoon, in charge of the assistant secretary. The officers for the current year, elected recently, are: President, H. M. Allison, representing the Packard Motor Car Company; vice president, C. W. Steiger, Stromberg Motor Devices Company; secretary, D. E. Whipple, Anderson Electric Car Company; treasurer, Henry Paulman, H. Paulman & Co.; directors, C. E. Gregory, Chalmers Motor Company; W. J. Hughey, W. J. Hughey & Co.; L. B. Garrison, General Motors Truck Company; Ralph Temple, Ralph Temple Automobile Company; H. C. Tilton, Stromberg Motor Devices Company.

The association conducts an information bureau, at which complete details of all American and foreign cars and accessories are available, accompanied by the name and address of the local representative. An employment bureau seeks to place manufacturers and dealers in possession of information as to salesmen, clerical as-

sistants, shop help, chauffeurs, etc., who are seeking employment. The second hand car market is also made the subject of special reports, issued quarterly. Membership cards are accepted by the police department in lieu of bonds, etc., in case of alleged violation of the motor vehicle laws or ordinances, and an attorney is retained to defend such cases.

Special attention is paid to legislative and good roads matters, and the association has been decidedly instrumental in co-operating with the Illinois Highway Improvement Association and the Associated Roads Organization of Chicago and Cook county. Last year it was extremely active in securing the defeat of 32 bills before the legislature that were detrimental to the interests of dealers and owners. It also co-operates with the Chicago administration in seeking to enforce the city ordinances and in preventing the passage of unjust and discriminating laws.

ORGANIZE RESEARCH CLUB.**Detroit Case Hardening and Heat Treating Foremen to Study Kindred Subjects.**

The majority of case hardening and heat treating foremen in Detroit, and several from out of town, met recently in that city to form the Steel Treating Research Club. The organization will meet once a month, to listen to metallurgists and men that can impart scientific knowledge of case carburizing, heat treating of carbon and alloy steels and various grades of tool steels.

The object will be to get the practical case hardeners and heat treaters together to discuss the various troubles which confront them. It will also enable them to exchange ideas, and to help each other in these lines of work. The membership will be limited to foremen, assistant foremen in these departments, toolsmiths and tool hardeners. The officers are: President, H. J. Lawson, Cadillac Motor Car Company; vice president, J. B. Ethier, Metal Products Company; secretary-treasurer, D. W. Bauer.

At the annual convention of the Pennsylvania Motor Federation in Erie, Penn., recently, the following officers were elected: President, Robert P. Hooper, Philadelphia; vice presidents, Albert H. Jarecki, Erie; Peter Meixell, Wilkesbarre; Stedman Bent, Philadelphia; David Johnson, New Castle, and John M. Core, Uniontown; secretary and treasurer, Paul C. Wolff, Pittsburgh. The next convention will be held in Reading, Penn.

TWO NEW TRUCKS ANNOUNCED.

The Steele and the Bay State Make Their Initial Appearance in Massachusetts.

The first Steele truck, made by W. H. Steele at Worcester, Mass., has made its appearance on the streets of Boston. It is understood that among its distinctive features are a new speed controlling device invented by the maker and the use of larger wheels than standard. Mr. Steele formerly made commercial vehicles, utilizing some of the parts of the Morgan truck, which was produced in Worcester and the assets of which he purchased in 1912.

The Britton-Stevens Corporation, which was organized recently in Cambridge, Mass., is building the Bay State truck in that city. The designer is said to be W. C. Guildler, formerly identified with the maker of the Mack truck in Allentown, Penn. He has been made vice president and general manager of the company.

SELL AMERICAN ASSETS.

Good Will Passes to Philadelphia Concern and Supplies to Chicago House.

At the sale of the property and assets of the American Motors Company, Indianapolis, Ind., conducted April 30 by Samuel L. Winternitz & Co., Chicago, which recently purchased these at a bankruptcy sale, the good will, patents, jigs, dies, etc., passed to the Levene Motor Company, Philadelphia, the bid being \$4000. All supplies, finished cars and parts were struck down to the Auto Parts Company of Chicago.

According to an announcement of the Levene company, it will continue the sale of parts and service for the approximately 45,000 American cars now in use. The supplies and parts taken over by the Auto Parts Company will be placed on sale at greatly reduced figures.

MOLINE-KNIGHT FORCE BUSY.

Whole Factory Working 12 Hours a Day and Automatic Machinery Night and Day.

Every possible effort is being made by the officials of the Moline Automobile Company, East Moline, Ill., to keep abreast of the demand for its Moline-Knight cars. Starting May 1 the entire force began working 12 hours a day, and the automatic machinery is running day and night. President W. H. Van Dervoort is authority

for the statement that there will be no over-production this year, so far as the Moline-Knight is concerned. The present difficulty is that of producing the cars fast enough to meet orders, keeping in mind the high degree of quality demanded by the Moline organization.

INDORSES PYRENE EXTINGUISHER.

State Fire Marshall of Indiana Makes Report for Department's First Year.

It is stated that 41 automobile fires have been reported to the state fire marshal of Indiana, since the office was established in May, 1913. But six fires resulted in the total loss of the machine. The causes, as shown by the statistics gathered by the fire marshal, were:

Gasoline explosion	12
Defective wiring	3
Carelessness with matches.....	3
Overheated exhaust	1
Adjoining fire	1
Unknown	22

The fire marshal makes comment as follows:

Gasoline is naturally the chief cause of all automobile fires. Since the explosions which occur not only result in fire, but very often in serious injury as well, owners cannot be too careful in seeing that all hazards are minimized.

One of the most dangerous practises followed by automobile drivers is the use of gasoline for cleaning the machine in a closed garage. This is doubly dangerous, if the gasoline is sprayed from a tank by air pressure, since the liquid quickly vaporizes and fills the garage with a highly explosive mixture of air and gas. But one pint of gasoline will make more than 200 cubic feet of air very explosive.

All automobile owners should take every precautionary measure against fire in the garage. No driver should put up his machine without first making sure that the lights are out, the engine cool and that no sparks are resulting from loose battery connections. One of the most dangerous practises permitted about the garage is smoking.

The small Pyrene extinguisher is recommended for extinguishing automobile fires. It is advised that all automobile drivers carry fire extinguishing apparatus with them in the car at all times.

The Bi-Motor Equipment Company, 180-182 Massachusetts avenue, Boston, an exclusively wholesale accessory house, is mailing free to the trade its annual catalogue. The book contains nearly 250 pages of illustrated and descriptive matter dealing with automobile supplies, accessories, etc. The company lists a most complete line of tools and shop equipment and carries a most comprehensive stock. The No. 65 catalogue is intended for the wholesale trade only.

The Reo Motor Car Company, Lansing, Mich., held a special stockholders meeting May 19 for the purpose of declaring a stock dividend of 100 per cent., payable in July.

ON ANOTHER LONG TRIP.

Vice President Westgard of National Highways Association Leaves New Orleans.

Announcement is made by the National Highways Association that A. L. Westgard, vice president and director of transcontinental highways in that organization, left New Orleans, La., May 12, on an 18,000-mile automobile trip through the Southwest and Middle West. He uses a large six-cylinder touring car, and, in addition, a light runabout for carrying spare parts, etc.

He will take up his work in Texas, where he left it last in December, and after surveying several routes in Texas, New Mexico and Oklahoma, he plans to go north as far as the Canadian border, then west to Yellowstone park, returning to cover the principal routes in the Middle West.

OPENS CLEARING HOUSE.

Milwaukee Auto Specialty Company Inaugurates New Business Under That Name.

The Milwaukee Auto Specialty Company, Milwaukee, Wis., has opened the Automobile Clearing House in its new fireproof garage at the corner of Seventh and Chestnut streets. The business will be conducted under entirely separate management and is held to be something entirely new in the automobile field.

The garage has about 36,000 square feet of floor space, and already about 150 cars are being shown. It is stated that there is room for 150 more. All owners who wish to sell their machines can place them on the floor at no cost.

AMERICAN EFFICIENCY SURVEY.

New Organization Perfected in Chicago to Study Motor Car Units.

While no definite information has been made public concerning the work it seeks to accomplish, some little interest attaches to the announcement of the recent incorporation of the American Efficiency Survey of Motor Car Units in Chicago. The officers are: President, Harry Newman; vice president, Kenyon W. Mix; secretary, David Minard Shaw; treasurer, Charles S. Castle. The offices of the organization are at 30 North Michigan avenue, Chicago.

It is stated that the organization is composed of engineers not connected with the automobile

industry, and that provision has been made to secure the use of the testing laboratories of the Purdue University in Lafayette, Ind. It would appear from the advance announcement that the survey expects to undertake the testing of motor car units, and place its seal of approval on such work as is submitted to it and found worthy, in order that the general public may be assured that it is purchasing goods of the proper quality. It is added that a more detailed announcement of the aims and purposes of the organization will be made shortly.

ERECTING NEW PLANT.

Works of the C. H. Stoddard Tire Company Now Nearing Completion in Millbury, Mass.

Following the completion of arrangements conducted by the Millbury Board of Trade, the C. H. Stoddard Tire Company has acquired the so-called Walling property in Millbury, Mass., and construction work is under way for the first of a series of buildings to be erected by that concern. The foundation already has been laid and carpenters are now engaged in raising the structure.

This will be of wood, 32 by 64 feet, with 14-foot posts, mill construction, with flat roof of tar and gravel. It is expected that machinery will be installed during this month, and that the work of producing tires will be begun in the near future.

FOR ORPHAN'S DAY.

Boston Automobile Dealers' Association Will Hold Annual Outing, June 10.

Chester I. Campbell, secretary of the Boston Automobile Dealers' Association, Boston, Mass., is completing arrangements for the annual orphan's day outing of the association at Nantasket Beach, June 10. It is expected that about 2500 crippled, orphaned and destitute children will be entertained by the dealers on that day, and for this purpose some 700 automobiles will be required. Members of the association will provide half of the cars, and owners in Boston and vicinity, the remainder.

The affair is non-sectarian in every respect, the list of children being supplied by Jewish, Catholic, Protestant, Salvation Army and other religious and civic societies. A luncheon and an elaborate programme of sports, etc., are planned for the enjoyment of the youngsters.

RAID OVERLAND FACTORY.

Two Hundred Hoosiers Decide They Will Not Wait for Cars to Come by Freight.

Some 200 residents of Indiana have notified the Willys-Overland Company, Toledo, O., that they will arrive in that city May 27 for the purpose of taking possession of that number of Overland cars. Although these people have been informed that the factory is turning out 230 machines a day with clock like regularity, they have decided that they will not await the arrival of these cars by freight.

The visitors will be entertained by the Willys-Overland Company during the day and over night, hotel accommodations having been arranged, and the grounds of the Overland club will be turned over to them. Wednesday afternoon, after a parade, which undoubtedly will be the longest procession of one make of machines ever seen, has been recorded on a moving picture film, the cars will be parked in Armory square. The start for Indianapolis, over the road, will be made early Thursday morning.

KISSELKAR IN WAR SERVICE.

Texas Man Purchases Machine That Is Scarred by Bullets of Mexican Soldiers.

Gail L. Jacoby of Corpus Christi, Tex., writes the Kissel Motor Car Company, Hartford, Wis., that he has recently purchased a 60 horsepower 1912 KisselKar that carries the marks of strenuous duty in the Mexican war. This machine, with three other KisselKars, was seized by the Constitutionalists and placed in service during the siege of Torreon.

There it was taken by the Federals and turned back to its owner, who fled across the Rio Grande and sold the car to Mr. Jacoby. The latter states that it is punctured with several bullet holes, but is in good shape mechanically and far from a "pensioner".

The Cadillac Motor Car Company, Detroit, secured two gold medals at the recent Philippine exposition in Manila, one for "the most instructive special automobile exhibit", won by a Cadillac chassis in operation, and the other, "for an example of special excellence".

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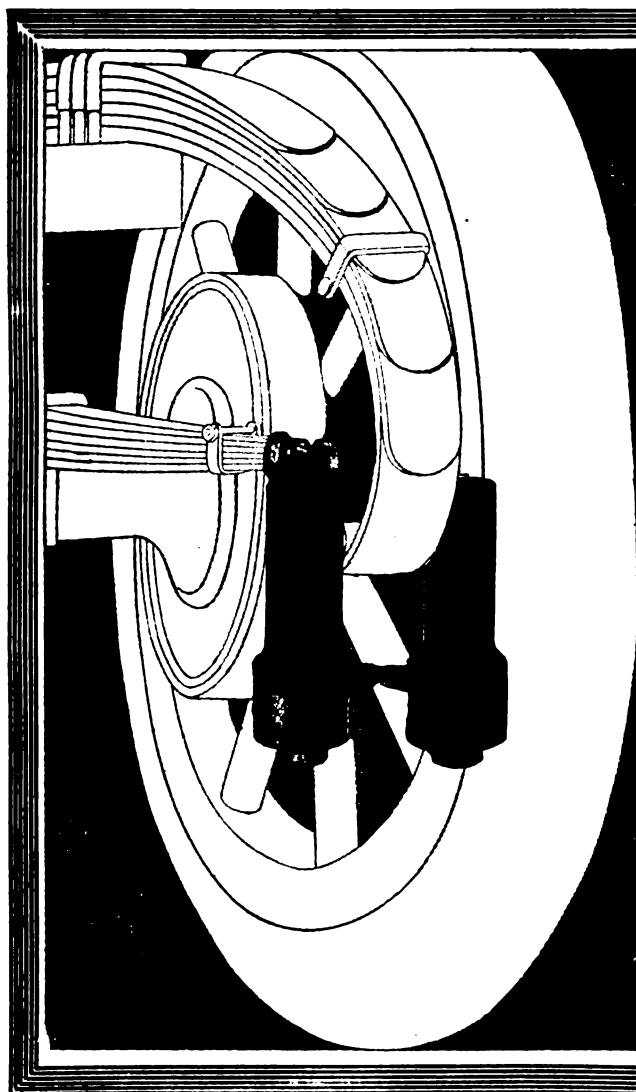
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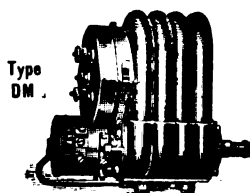
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Bi-Motor Equipment Co., 180-182 Massachusetts Ave., Boston.
Danver Accessory Co., 18 Broadway, Pawtucket, R. I. (Daco.)
Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.
Miller, Chas. E., 97-103 Reade St., New York.
Branches: 202-204 Columbus Ave., Boston; Bridge and Dwight streets, Springfield, Mass.; 274 Trumbull St., Hartford, Conn.; 924 Eighth Ave. and 2782 Broadway, New York; 1421 Bedford Ave., Brooklyn, N. Y.; 318 No. Broad St., Philadelphia; 824 Main St., Buffalo, N. Y.; 1829 Euclid Ave., Cleveland; 227 Jefferson St., Detroit; 259 Peachtree St., Atlanta, Ga.; 601-603 Baronne St., New Orleans, La.; 135 Central Ave., Albany, N. Y.; 274 Halsey St., Newark, N. J.
Milwaukee Auto Specialty Co., 705-711 Chestnut St., Milwaukee, Wis.
Motor Parts Co., 185-187 Columbus Ave., Boston; 818 No. Broad St., Philadelphia; Springfield, Mass.
Northwestern Chemical Co., Marietta, O.
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Ahlberg Bearing Co., 2624 Michigan Ave., Chicago; 1786 Broadway, New York City; 805 Woodward ave., Detroit.
Boyd, F. Shirley, 903 Boylston St., Boston. (R. I. V.)
Hyatt Roller Bearing Co., Detroit.
Marburg Bros., Inc., 1790 Broadway, New York. (S. R. O.)
New Departure Mfg. Co., Bristol, Conn.
R. I. V. Co., 1771 Broadway, New York. (R. I. V.)

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Edison Storage Battery Co., 137 Lakeside Ave., Orange, N. J. (Edison.)
Electric Storage Battery Co., Philadelphia. (Exide.)
Gelsler Bros. Storage Battery Co., 514 W. 57th St., New York.
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Mets Company, Waltham, Mass. (Metz.)

Moline Automobile Co., E. Moline, Ill. (Moline.)

National Motor Vehicle Co., 1033 22nd St., Indianapolis. (National.)

(Continued on Next Page.)

(BUYERS' GUIDE—Continued.)

Nordyke & Marmon Co., Indianapolis. (Marmon.)
 Paige-Detroit Motor Car Co., Detroit. (Paige.)
 Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)
 Premier Motor Mfg. Co., Indianapolis, Ind. (Premier.)
 Reo Motor Car Co., Lansing, Mich. (Reo.)
 Salvador Motor Co., Farragut Bldg., Massachusetts Ave., Boston. (Salvador.)
 Studebaker Corp., Detroit. (Studebaker.)
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 Willys-Overland Co., Toledo, O. (Overland.)

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 Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)
 Reo Motor Car Co., Lansing, Mich. (Reo.)
 Studebaker Corp., Detroit. (Studebaker.)
 Velle Motor Vehicle Co., Moline, Ill. (Velle.)
 Willys-Overland Co., Toledo, O. (Willys Utility and Garford.)

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(BUYERS' GUIDE—Continued.)

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CYLINDER CLEANING COMPOUND.

Bowling Green Sales Co., 80 Flatbush Ave., Brooklyn, N. Y. (Ball Carbon Remover.)

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.

Milwaukee Auto Specialty Co., 705-711 Chestnut St., Milwaukee.

Northwestern Chemical Co., Marietta, O. (Carbonox.)

Prest-O-Lite Company, 226 Speedway, Indianapolis. (Prest-O-Carbon Remover.)

Branches: Atlanta, Baltimore, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Indianapolis, Jacksonville, Kansas City, Los Angeles, Milwaukee, Minneapolis, New York, Omaha, Philadelphia, Pittsburgh, Providence, San Francisco, Seattle, St. Louis and St. Paul.

ELECTRIC LIGHTING EQUIPMENT.

Culver-Stearns Mfg. Co., Worcester, Mass.; Detroit.

FAN BELTS.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

FIRE EXTINGUISHERS.

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

Northwestern Chemical Co., Marietta, O. (Fire-Fly.)

Pyrene Co. of New England, 176 Federal St., Boston.

FORD AUTOMOBILE EQUIPMENT.

Danver Accessory Co., 18 Broadway, Pawtucket, R. I. (Daco.)

Russell Mfg. Co., Middletown, Conn.

FUNNELS.

Dover Stamping & Manufacturing Co., Cambridge, Mass. (Dover.)

GASKETS AND GASKET CUTTERS.

Shawver Co., Springfield, O.

GEARS, STEERING.

Ross Gear & Tool Co., 794 Heath St., Lafayette, Ind.

GUNS, GREASE. (See Pumps, Oil and Grease.)
(Continued on Next Page.)

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Junction, Philadelphia. (Monoplex.)****IGNITION EQUIPMENT.****Kent Mfg. Works, Atwater, 4937 Stenton Ave., Wayne
Junction, Philadelphia.****INSULATION.****Johns-Manville Co., H. W., Madison Ave. and 41st St.
New York City.****JACKS, ETC.****Shawver Co., Springfield, O.****LAMPS, TAIL. (See Tail Lights.)****LEATHER GOODS.****Perkins-Campbell Co., 622 Broadway, Cincinnati, O.****LIGHTING SYSTEMS, ELECTRIC.****Garford Mfg. Co., Elyria, O. (Dynalux.)****Johns-Manville Co., H. W., Madison Ave. and 41st St.
New York City.****LOCKING DEVICES.****Headlight Support Co., 1217 Dime Bank Bldg., Detroit.
(Gasolock.)****LUBRICANTS.****Alsten & Goulding Co., 36 Foster St., Worcester, Mass.
(Alding.)****Dixon Crucible Co., Jos., Jersey City, N. J. (Graphite.)****Eagle Oil & Supply Co., 104 Broad St., Boston. (Eagle-
line No-Karbon.)****Haws, Geo. A., 148 Front St., New York. (Panhard.)
Branch: 899 Boylston St., Boston.****Indian Refining Co., 17 Battery Place, New York City.
(Havoline.)****Miller, Chas. E., 97-103 Reade St., New York. (Pan-
American.)****Branches: See Accessory Manufacturers.****New York & New Jersey Lubricant Co., 165 Broadway,
New York. (MoToRol, Non-Fluid, Kejex.)****Northwestern Chemical Co., Marietta, O. (Gear-Silence.)****Platt & Washburn Refining Co., 7 Broadway, New York
City. (Veedol.)****Standard Oil Co., New York. (Polarine.)****Branches: In all cities.****Vacuum Oil Co., Rochester, N. Y. (Mobiloil.)****Branches: 49 Federal St., Boston; 29 Broadway, New
York; Fourth and Chestnut Sts., Philadelphia; 154 Ex-
change St., Bangor, Me.; 406 Hitchcock Bldg., Spring-
field, Mass.; 117 Commercial St., Portland, Me.; Fisher
Bldg., Chicago; Ford Bldg., Detroit; Indiana Pythian
Bldg., Indianapolis.****Valvoline Oil Co., 27 State St., Boston. (Valvoline.)****MAGNETO COVERS.****Perkins-Campbell Co., 622 Broadway, Cincinnati, O.****MAGNETOS AND SUPPLIES.****Bosch Magneto Co., 223-225 W. 46th St., New York.****(Continued on Next Page.)****STABILITY**

is found only in a straight, distilled, unmixed oil. It is that quality which enables it to stand up under great cylinder heat without being "shot to pieces."

Polarine

was chosen to lubricate this car on its trip through the rocky, cylinder-heating grades of the Grand Canyon — because it had stability.

Polarine is not affected by heat or cold, it is non-carbonizing.

It is the oil for your trip.

For sale at all good garages; but be sure you get Polarine. If in doubt send us a sample of the oil for analysis.

Socony Motor Gasoline
is the best

STANDARD OIL CO. OF NEW YORK

New York
Buffalo



Albany
Boston



"PASS THEM ALL"



Knox
BEST BY TEST

MOTOR CARS

Send for Pleasure or Commercial Catalogue.
KNOX MOTORS CO., SPRINGFIELD, MASS.



Cartercar
GEARLESS TRANSMISSION

SMOOTH—QUIET—POWERFUL
Model 7, \$1250

Other Models \$1600, \$1700, \$1900, \$2000
Write for full particulars and catalogue

Cartercar Company Pontiac Michigan

LEXINGTON || **HOWARD**
"FOUR" \$1335 "SIX" \$2375

It's the men behind them that make them leaders of their class.
Send for descriptive catalogs.

THE LEXINGTON-HOWARD COMPANY
131 Main Street, Connersville, Ind., U. S. A.

F. SHIRLEY BOYD
903 Boylston St. Boston, Mass.

Dorian Demountable Rims.
J. H. S. Shock Absorber. R. I. V. Ball Bearings.

ASK FOR COLUMB TREAD NON-SKID
PROWODNIK Russian Tires

Made for Russian Roads
BEST ON ALL ROADS

COLUMB TYRES IMPORT CO., Inc., 1891 B'w'y, N.Y.

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DETROIT, U. S. A.

(BUYERS' GUIDE—Continued.)

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Eisemann Magneto Co., 225-227 W. 57th St., New York City. (Eisemann.)
Branches: 514 No. Capitol Ave., Indianapolis; 802 Woodward Ave., Detroit.
Helme Electric Co., Lowell, Mass. (Heco.)
Holtzer-Cabot Co., Brookline, Mass.
Branches: 101 Park Ave., New York City; 6161-65 So. State St., Chicago; 1005 Union Trust Bldg., Baltimore, Md.
Marburg Bros., 1790 Broadway, New York. (Mea.)
Splittorf Electrical Co., 98 Warren St., Newark, N. J.
Branches: 10-20 W. 63rd St., New York; 1110 S. Michigan Ave., Chicago; 180-182 Massachusetts Ave., Boston; 1028 Geary St., San Francisco; 972 Woodward Ave., Detroit; 1228 S. Olive St., Los Angeles, Cal.; S. W. Corner Cherry and Juniper Sts., Philadelphia; 1823 Grand Ave., Kansas City; 1628 Broadway, Seattle, Wash.; London, Eng.; Buenos Aires.

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New York Coil Co., 338 Pearl St., New York City.

MEASURES.

Dover Stamping & Manufacturing Co., Cambridge, Mass. (Auto and Savol.)

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Northwestern Chemical Co., Marietta, O. (Hydrometers and Thermometers.)

MOTOR STARTERS.

Automatic Appliance Co., 172 Columbus Ave., Boston. (Boston.)

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.

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Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

PAINT, ANTI-RUST.

Northwestern Chemical Co., Marietta, O. (Never-Rust.)

PISTON RINGS.

McQuay-Norris Mfg. Co., Dept. D, St. Louis, Mo. (Leak-Proof.)

POLISH.

International Metal Polish Co., Quill St. and Belt R. R., Indianapolis, Ind. (Blue Ribbon.)

Johns-Manville Co., H. W., Madison Ave., and 41st St., New York City.

Northwestern Chemical Co., Marietta, O.

PRIMERS.

Duelec Vaporizing Primer Co., 14 North Broadway, Yonkers, N. Y. (Duelec Vaporizing.)

(Continued on Next Page.)

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(BUYERS' GUIDE—Continued.)

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The Automobile Journal, 24 issues, \$1.00 the year.	
The Motor Truck (Commercial Car), Monthly, \$2.00 the year.	
The Accessory and Garage Journal, Monthly, \$2.00 the year.	
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The Motorcycle, Maintenance, Repair and Construction35
The A B C of Motor Car Chassis Maintenance and Repair25
Maintenance and Repair of Motor Car Tires25
Send Postpaid to any address in United States upon receipt of price. Address all communications to The Automobile Journal, Times Building, Pawtucket, R. I.	

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Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.

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Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.
 Green & Swett Co., 737 Boylston St., Boston. (Tri-Phoon Car and Garage.)
 Shawver Co., Springfield, O.

REAMERS.

Martell Motor Co., 1928 Columbus Ave., Boston. (Martell Aligning.)

RIMS—REMOVABLE AND DETACHABLE.

Boyd, F. Shirley, 903 Boylston St., Boston. (Dorian.)
 Chester Demountable Rim Co., Fall River, Mass. (Chester Demountable.)
 United States Tire Co., Broadway and 58th St., New York. (Continental and Whittlesey Demountable.)
 Branches: New York, Chicago, San Francisco.

RINGS. (See Piston Rings.)

ROAD BUILDING MATERIALS.

Barrett Manufacturing Co., New York. (Taryia.)
 Branches: Chicago, Philadelphia, Boston, St. Louis, Cleveland, Pittsburg, Cincinnati, Kansas City, Minneapolis, New Orleans, Birmingham, Ala.; Seattle, London, Eng.; Montreal, Toronto, Winnipeg, Vancouver, Can.; St. John, N. B.; Halifax, N. S.

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Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

SELF-STARTERS. (See Motor Starters.)
 (Continued on Next Page.)

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True Trade Mailing List Economy

YOU CAN SAVE

Cost of List
 Cost of Clerk Hire
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 Cost of Maintenance
 Cost of Lost Printed Matter

YOU ELIMINATE SUPERVISION ALL WASTE

ALL UNCERTAINTY

YOU GAIN

In Ratio to Number of Names Used Hundreds of Dollars Monthly. Highest Efficiency Service at a Tenth of Your Own Service Expense. All Resources of a Highly Specialized Organization Whenever Needed, Reaching Every Active Trade Interest.

FOR PROOF WRITE

Accessory and Garage Journal
 Times Building Pawtucket, R. I.



WHY USE INFERIOR PLUGS WHEN CENTERFIRE

can be bought at the same price? They overcome all Engine troubles, fire where others fail and **Add Power** to engine. Any length point desired made to order. Try them and you will use them—always. Make a trial and save money. \$1.00 each, 6 for \$5.00.

GUARANTEED

Agents wanted and special prices to dealers.

Milwaukee Auto Specialty Co.
705-707-709-711 Chestnut St., Milwaukee, Wis.

The Fastest Riding
Car in the
World

MARMON

F. E. WING
562 Commonwealth Ave.
BOSTON, MASS.

New England Dealer for

NORDYKE & MARMON CO., Indianapolis, Ind.

MARMON "48"
\$5000
MARMON "41"
\$3250
MARMON "32"
\$3000

New Departure Guaranteed Ball Bearings

American Made for American Trade

THE NEW DEPARTURE MFG. CO. Bristol, Conn.
Western Branch, 1018-17 Ford Bldg., Detroit

COLGATE'S MECHANICS' SOAP PASTE

A hand cleanser, pleasantly perfumed. It removes grime and grease but is "kind to the skin." Sample sent for 2 cents.

COLGATE & CO., Dept. 22, 199 Fulton St., NEW YORK

\$485 Salvador Car \$485

Four-Cylinder, Water-Cooled Unit Power Plant with Three Speed Selective Transmission and Shaft Drive. The Quality and Equipment of the High-Priced Car at Cyclecar Price.

SALVADOR MOTOR CO., 126 Massachusetts Avenue
Boston, Mass.

COLE

THE
STANDARDIZED
CAR



The car that started the stampede to standardization
A Cole franchise is a valuable asset to any dealer. Find out about it.

Cole Motor Car Co. of Indianapolis

Vanadium Varnishes are the quickest drying in the world. Save one to five days. Used on America's finest cars.

VALENTINE'S VALENTINE & COMPANY
NEW YORK BOSTON CHICAGO TORONTO

(BUYERS' GUIDE—Continued.)

SHIELDS, MOTOR.

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City. (Asbestos.)

SHOCK ABSORBERS AND SUPPLEMENTARY SPRINGS.

Boyd, F. Shirley, 903 Boylston St., Boston.
J. M. Shock Absorber Co., 210 So. 17th St., Philadelphia. (J. M.)

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.
Sager Co., J. H., 271 South Ave., Rochester, N. Y. (Peerless.)

SOAPS.

Colgate & Co., 199 Fulton St., New York City. (Moto-Gloss and Mechanics' Soap Paste.)
Northwestern Chemical Co., Marietta, O. (Dermalene.)

SPARK PLUG CASES.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

SPARK PLUGS AND IGNITERS.

Alsten & Goulding Co., 36 Foster St., Worcester, Mass. (Alding.)
Bosch Magneto Co., 223-225 W. 46th St., New York.
Branches: See Magnetos and Magneto Supplies.
Heinze Electric Co., Lowell, Mass. (H. E. Co. Priming.)
Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.
Mosler, A. R. & Co., P. O. Box M, Mt. Vernon, N. Y. (Split-Fire.)
Silvex Company, The, 60 Wall St., New York City. (Bethlehem Five Point.)
Splitdorf Electrical Co., 98 Warren St., Newark, N. J.
Branches: See Magnetos and Magneto Supplies.

SPARK PLUG TERMINALS.

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City.

SPEEDOMETERS, RECORDERS, ETC.

Johns-Manville Co., H. W., Madison Ave. and 41st St., New York City. (Electric.)
Northwestern Chemical Co., Marietta, O. (Hydrometers and Thermometers.)

SPRINGS FOR AUTOMOBILE SUSPENSION.

Marburg Bros., Inc., 1790 Broadway, New York. (Marburg-Hagen.)

SPROCKETS.

Boyd, F. Shirley, 903 Boylston St., Boston. (Baldwin.)

STEEL, ETC.

Ward's Sons, E. T., 25 Purchase St., Boston, Mass. (Seamless.)

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TAIL LIGHT DETECTORS.

TAIL LIGHTS.

TANKS, ACETYLENE GAS.

TANKS, TIRE INFLATING.

TAPE, ASBESTOS.

THERMOS CASES.

TIRE ACCESSORIES.

TIRE CHAIN GRIPS. (See Chains.)

TIRE PRESERVATIVES AND PROTECTORS.

TIRES—CASINGS AND INNER TUBES.

(Continued on Next Page.)

**Prolong the life—increase the service
and smooth-running qualities of
your car—and economize your
oil bills, by using—**

TRADE MARK
NON-FLUID OIL
REGISTERED IN
UNITED STATES
PATENT OFFICE

Ask for the orange-colored can bearing the sprocket wheel trade mark.

Sold by leading supply houses and
garages, or write to

1430 Michigan Ave., Chicago

**Ask for sample, giving us
name of Dealer or Jobber**

W. A. Blackburn, Eastern Distributor, 335 Broadway, Moffat Bldg., New York

HAYNES

Catalog covering this season's models upon request.

The Haynes Automobile Company
6 Main Street, Kokomo, Ind.

Space Contributed by The Automobile Journal.

How You Can Help



THE LINCOLN HIGHWAY



"A continuous, connecting, improved highway from the Atlantic to the Pacific."

Do you want to be one of that great army of progressive patriots who are helping to build a greater, more beautiful and more prosperous America?

Do you want to join with a million others, in the pushing through of an unselfish work which means more business, more pleasure and more advantages to all?

Do you want to help in the building of an eternal monument to the greatest name in the history of our country, to the greatest man the nineteenth century produced—Abraham Lincoln?

Do you wish to aid in the completion of the most practical enterprise ever undertaken by the American people? A 3400-mile link connecting the two oceans, to be used by, and directly profiting sixty millions of our population?

If you do, join the Lincoln Highway Association.

It's a great organization—a grand work to feel in sympathy with. Costs but \$5.00, payable once. The price of one good dinner, of one ten-cent cigar a week for a year, makes you a contributor and places your name on that vast list of patriots which generations to come will have cause to bless.

Get out your check book now. Here's a chance for you to build a portion of a lasting monument, the longest improved road in the world.

We have a pair of Lincoln Highway pennants, like the illustration, for your car. They will come to you for a dollar, prepaid.

A big map of the United States, showing the route of the Lincoln Way, is a fine thing to have on the wall of your office. It's backed with cloth, printed in three colors and costs \$2.00.

All the real Lincoln Highway boosters are wearing a little red, white and blue lapel button—they're twenty-five cents. Wear one.



Send the five to
The Lincoln Highway Association
 Dime Bank Building DETROIT, MICHIGAN

THE LINCOLN HIGHWAY ASSOCIATION, DETROIT, MICHIGAN.

Gentlemen:

I regard it as a privilege to be one of the many who will make THE LINCOLN HIGHWAY possible, and am accordingly sending along my check for Five Dollars as my subscription to this glorious cause.

NAME

ADDRESS



Check here if you will sell certificates to your friends.

(BUYERS' GUIDE—Continued.)

TIRES—SOLID AND COMMERCIAL.

Goodrich Co., B. F., Akron, O. (Goodrich.)

Polack Tyre and Rubber Co., 246 W. 59th St., New York City. (Polack.)

United States Tire Co., Broadway and 58th St., New York.
 Branches: See Rims—Removable and Detachable.

TOPS AND ATTACHMENTS.

Springfield Metal Body Co., 20 Medford Ave., Springfield, Mass.

TRUCKS AND TRACTORS—(See Cars, Commercial.)

TRUNK RACKS.

Connecticut Steel & Wire Co., Hartford, Conn.

TUBING, GAS.

Johns-Manville Co., H. W., Madison Ave. and 41st St.

VALVE LIFTERS.

Winsor Manufacturing Co., Providence, R. I.

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VARNISHES, ETC.

Valentine & Co., 466 Fourth Ave., New York City; 348 S. Dearborn St., Chicago; 74 Pearl St., Boston.

VENTILATORS.

Wattles, C. B., 441 Butler Exchange, Providence, R. I.
 (Excelsior Adjustable.)

VIBRATORS. (See Master Vibrators.)

VOLTMETERS—(See Ammeters.)

VULCANIZERS.

National Motor Car Supply Co., 5604 Euclid Ave., Cleveland. (National Garage Steam and Wizard Automatic.)
Vanderpool Co., Springfield, O.
Williams Foundry & Machine Co., Akron, O.

WELDING OUTFITS.

Prest-O-Lite Company, 226 Speedway, Indianapolis.
 (Prest-O-Welder.)
 Branches: See Cylinder Cleaning Compound.

WRENCHES AND COMBINATION OUTFITS.

Coes Wrench Co., Worcester, Mass.
Cutter, George A., Taunton, Mass.
Mossberg Co., Frank, Attleboro, Mass.

Pierce-Arrow



The Durability of Perfect Balance

Pierce-Arrow Automobiles represent the highest average of desirable motor car qualities yet attained. A Pierce-Arrow car is a safe car and it is fast; it is a splendid hill climber; it is a strong car and it is light; it is most economical in its use of oil; it wastes no gasoline. No one desirable quality has been sacrificed to another. A balance of all desirable qualities has resulted in a splendidly practical whole.

Strength is placed first because it means steadfastness, and that means safety—which is paramount. Comfort is an essential factor because without it the pleasure is taken out of a pleasure car. Beauty has been considered as a vital attribute—but the beauty of liteness, of grace.

The result is a well-balanced, all-around car into which so much vitality has been built originally that we have yet to see the Pierce-Arrow which, after years of service, has not retained the enduring vigor that can come only from materials of excellence, wisely chosen and intelligently combined.

Pierce-Arrow cars are built in three chassis sizes, 38, 48 and 66 horsepower. These chassis are equipped with many types of open and enclosed bodies, including a runabout with interchangeable Victoria and coupe top.

THE PIERCE-ARROW MOTOR CAR COMPANY

BUFFALO

NEW YORK



Wanted!

A representative in every section of New England, New York and New Jersey, inside the next ten days. To the right man or firm we offer an extraordinary business opportunity.

THE DETROITER CAR is too well known to need description here. It leads the \$1,000 class. A safe car. A strong car. A fuel-saving car. A powerful car that will take any grade where its wheels can find traction. The only car of its class with full floating rear axle, ball bearings throughout, 32 h. p. motor and platform springs. Made by a firm that never borrowed a penny but has won conspicuous success through giving quality to the car and co-operation to its dealers.

Until this year practically every Detraiter that could be built was taken by western dealers because of the ability of the car to negotiate the rough western roads and hills. Now—this season—the Detraiter is coming into the East and coming strong. Success is assured.

A Complete Line - \$850 to \$1050

Stream Line or Torpedo Body in wide variety of equipment
Eastern territory is now being allotted. We want one of the best dealers in every eastern county within the next ten days. Address your communications to

BRIGGS-DETROITER COMPANY

5005 Holbrook Avenue, DETROIT, MICH.

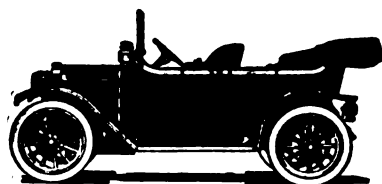
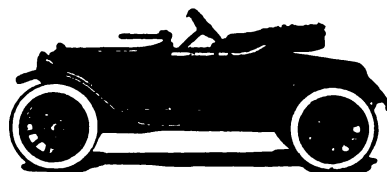
OR

DONNELLY & COMPANY

245 West 55th Street

Eastern Distributors

NEW YORK CITY

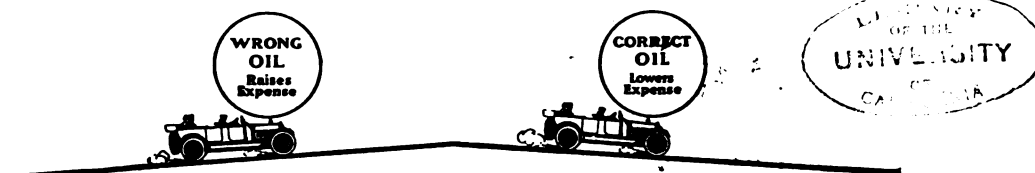


AUTOMOBILE JOURNAL

\$1.00 the year
10 cents the copy

PAWTUCKET R.I.

June 10, 1914



Fuel and Repairs

You can lower these expenses

IN three years' time supplies and repairs occasionally cost as much as the original price of a car.

Careless lubrication is responsible for most of this expense.

A canvass among New York repair shops showed that about one-half of the automobile engine troubles are caused by incorrect lubrication.

There are two things that must always be considered in an oil. One is its quality. The other is its fitness for your motor.

Low-quality oil in time may bring practically every trouble a motor can face.

Oil of a *body* which is incorrect for your motor brings many penalties—heating and seizing of bearings, worn wrist pins, poor compression, breaking of parts, excess carbon deposit smoking or overheating of engine and many other troubles.

Aside from repair troubles you must face a plain fact:

The more power you waste the more fuel you must consume.

The various grades of Gargoyle Mobiloils, purified to remove free carbon, are:

Gargoyle Mobiloil "A"
Gargoyle Mobiloil "B"
Gargoyle Mobiloil "E"
Gargoyle Mobiloil "Arctic"



Mobiloils

A grade for each type of motor

VACUUM OIL COMPANY, Rochester, N. Y., U. S. A.

Specialists in the manufacture of high-grade lubricants for every class of machinery. Obtainable everywhere in the world.

DETROIT 321 Free Press Bldg. BOSTON 49 Federal St. NEW YORK 61 Broadway CHICAGO Fisher Building 4th & Chestnut Sts. PHILADELPHIA Indiana Pythian Bldg. INDIANAPOLIS Plymouth Bldg. MINNEAPOLIS Fulton Bldg. PITTSBURGH

You cannot get perfect lubrication unless the *quality* is right, and the *body* of your oil suits—

- | | |
|---|--------------------------------------|
| (1) Your type of lubrication system. | (4) Your bore and stroke. |
| (2) Your piston clearance. | (5) Your engine speed. |
| (3) Your bearing design and adjustment. | (6) The size and location of valves. |
| | (7) Your cooling system. |

Gargoyle Mobiloils are sold by a *Chart* which specifies the correct grade for each car.

They are backed by almost 50 years' experience which has won for us the world-leadership in scientific lubrication.

If you do not at present use the grade of Gargoyle Mobiloils specified for your car, you may feel almost certain that your bills for fuel and repairs are higher than they should be.

It is safest to buy in original barrels, half-barrels and sealed five and one-gallon cans. See that the red Gargoyle, our mark of manufacture, is on the container.

On request we will mail a pamphlet on the Construction, Operation and Lubrication of Automobile Engines. It describes in detail the common engine troubles and gives their causes and remedies.

They can be secured from reliable garages, automobile supply houses, hardware stores, and others who supply lubricants.

For information, kindly address any inquiry to our nearest office.

ONE manufacturer advertises "Think of it—a 35 horsepower car for only \$1350."

Wonderful!

However, that's pretty good advice. Thinking of it will do you no harm. In fact, the more you "think of it" the more you are brought to realize how absurd the statement is.

Don't permit yourself to be influenced by false enthusiasm.

Do you know that the Overland has a 35 horsepower motor?

And the Overland costs only \$950.

That's something real to think about!



\$950 Completely
equipped

\$1075 With electric starter
and generator

Prices f. o. b. Toledo, Ohio

The Willys-Overland Company, Toledo, Ohio

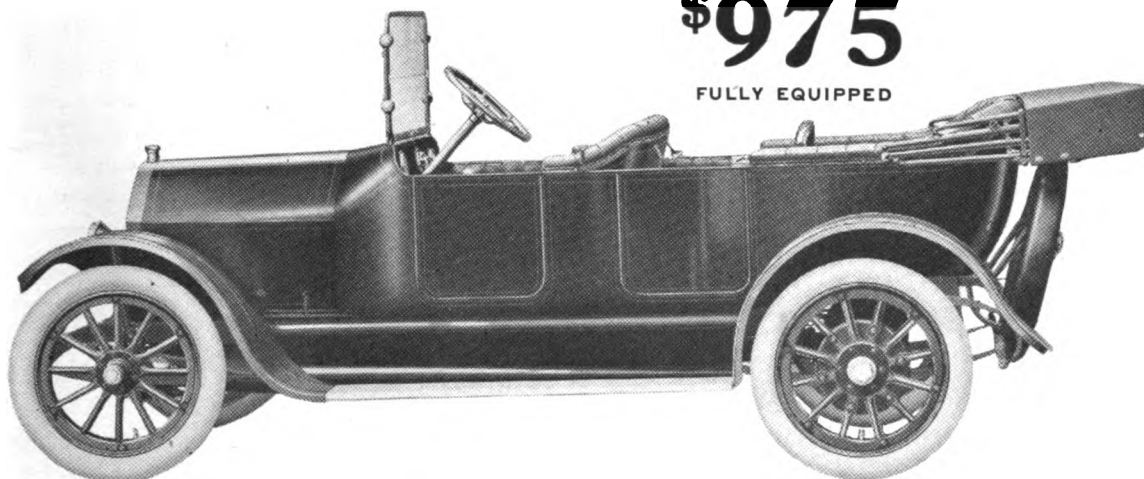
Manufacturers of the famous Overland Delivery Wagons, Gatford and Willys-Utility Trucks. Full information on request.

Stop! Read! Heed!

Partin-Palmer "38"

\$975

FULLY EQUIPPED



SIX-PASSENGER—38 H. P.—115 INCH WHEELBASE
Electric Starter and Lighting System If Desired

Live Dealers, Quick—Don't Be Too Late!

Watch the high-priced cars struggling to come down to our price—but don't lose money *waiting* for them.

The motor car buyer has awakened to the fact that he has been paying too much. He has demanded three things—a big, roomy, comfortable, six-passenger car—not less than 38 H. P.—at a price less than \$1000—and here it is—the Partin-Palmer "38"—ready to deliver to you *immediately*—ready for you to sell at a *profit*—a live car for live dealers.

From Maine to California—in every quarter of the globe—you will find satisfied and delighted owners of this Partin-Palmer "38."

Some one in your territory is going to make big money this season selling the Partin-Palmer "38."

Are you the Man?

Just say you are interested and we will place in your hands by return mail full and complete description of this wonderful seller—and satisfy you as to our financial responsibility and ability to make deliveries.

This is the season for the popular priced car—with the Partin-Palmer "38" on your sales floor you can laugh at competition.

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After you have fixed up a car and the owner talks that way—you get the next repair job.

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Thermoid HYDRAULIC COMPRESSED Brake Lining—100%

It's embarrassing if the car won't start promptly; it's *dangerous* if it won't stop *quickly*. Use **Thermoid Brake Lining** on the next repair job (it costs you no more) and tell the owner you have used it. That'll please him, for he knows **Thermoid** almost as well as you do.

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Trenton, New Jersey, U. S. A.

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PUBLISHED SEMI-MONTHLY AT PAWTUCKET,
R. I.

(Required by the Act of August 24, 1912.)

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D. O. Black, Jr.....Pawtucket, R. I.

Known bondholders, mortgagees and other security holders, holding one per cent. or more of total amount of bonds, mortgages, or other securities: NONE.

(Signed) WM. H. BLACK, Member of Firm.

Sworn to and subscribed before me this sixth day of April, 1914.

(Signed) THOS. P. CORCORAN, Notary Public.

(SEAL) (My Commission expires July 3, 1914.)

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EIGHTH ANNUAL TOURING NUMBER

OF THE

Automobile Journal

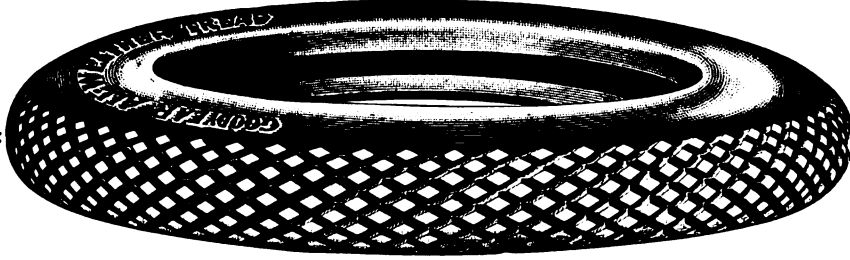
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Goodyear No-Rim-Cut tires dropped 28 per cent. last year. Now these tires—once the high-priced tires—undersell 16 other makes.

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It's a rather queer situation. Goodyear tires hold top place in Tiredom. They have more prestige, more users than any other tire. They have four great features found in no rival make.

Yet 16 makes, by their extra price, assume an extra quality—a better tire than Goodyears.

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There is no better tire than Goodyears. That is self-evident. A better tire would out-sell Goodyears. Men would quickly find it out.

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Our multiplied output, our new equipment, our efficient methods did it. In no other factory could equal tires be built at the Goodyear cost. And we last year pared our

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Don't pay more for tires which lack these features. Almost any dealer, if you ask him, will give you Goodyear tires.



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A growth of 7,000,000 in four years has placed the United States in a position where it "looms as the true colossus of the modern world".

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It has remained for the United States to carry to successful termination, that gigantic project—the Panama Canal.

In constructive work of all kinds the American Nation has taken the lead, holding her Light of Liberty and Peace high above sordid jealousies and selfish desires, setting for the whole world a worthy and well meaning example of true Brotherhood and Co-operation. Justly we may be proud that we are Americans.

For another great thing is to be done—there is to be a true "Uniting of the Union." A great shining band of Brotherhood is to be stretched across the continent, from coast to

coast, state to state, city to city, linking the hearts of all true Americans still closer together.

The Lincoln Highway—continuous, connecting, improved—a road of beauty and comfort—*Your Way and My Way.*

A splendid national monument dedicated to the great citizen of the Republic, who stands as exponent of fine courage, lofty aspiration, and vigorous, masterful American genius. Lincoln could have no more appropriate—no more enduring—tribute.

You can share—you can help, in the building of this glorious memorial.

Do it—send five dollars to—

Send an additional dollar and get a pair of Lincoln Highway pennants for your car. We also have some fine big wall maps in three colors, which show the route of the Highway, a great thing for your office, for two dollars

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is the cheapest oil in the long run. It stands up under cylinder heat. You don't have to drain it out of the crank case because it's shot to pieces and too thin to lubricate.

Polarine was used as the oil for this car on its hard trip through the Grand Canyon; it's the oil for your trip—the standard oil for all motors.



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ALBANY

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THE OIL THAT SUITS
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There are nine distinct types of lubricating systems in general use. No one oil, however high its quality, is suitable for all of them.

An oil that does not suit the particular lubricating system of your car will result in engine trouble as surely as though it were the poorest oil on the market.

Learn which lubricating system your engine has and use the grade of Veedol that is best for it

The VEEDOL LUBRICATION CHART will show you exactly which grade of Veedol is best suited for your car. It was prepared after a study of all brands of automobile oils on the market, and scientific research into the requirements of the motor engines in the various American and Foreign automobiles.

The types of lubricating systems employed in internal combustion engines are as follows:

1. Full Splash.
2. Splash with Circulating Pump.
3. Pump Over and Splash.
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Last a Lifetime, and are 30% Stronger
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Ease of Handling Without Fear of Slipping or Bruis-
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Proven the most popular;
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12th Mercedes	Bosch Magneto	Bosch Plugs

*Your car to be best equipt
must be Bosch-Equipt. See
your dealer or order direct.*

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Detroit

199 Service Stations to Serve Bosch Users

San Francisco
Toronto

When Writing to Advertisers, Please Mention The Automobile Journal.

PUBLISHER'S AND READER'S PAGE.

Each Issue of The Automobile Journal is a little bit better than the one which preceded it. This is an owner's motoring magazine, and as such it aims to present that which will not only meet with the approval of motor car users, but afford them every opportunity for becoming intimately acquainted with the products of the industry. Special attention is paid to needs of the prospective owner and the novice, as well as the man who desires to obtain the fullest measure of satisfaction, economy and efficiency from his machine.

The Departments devoted to suggestions for new owners and the timely articles dealing with the matters of care and maintenance, with particular application to the light automobile, are intensely practical. If you have not been following this feature closely, now is the time to begin. The Automobile Journal wants to serve you in the fullest measure possible. The object is to present these discussions in simple, non-technical language, but if anything remains that is not entirely clear, you are invited to make the freest use of the correspondence columns.

July 10 is the date of issue for the Eighth Annual Touring Number of The Automobile Journal. Reference already has been made to this special number on this page several times. Hundreds of tours, illustrated with hundreds

of new photographic reproductions of scenes of interest and beauty, each tour delineated on a map that can easily be followed in the car, and every itinerary completely routed in both directions. The data cover every section of the United States and Canada. The information presented could not be secured in any other form for less than 100 times the price.

Order Now—Hundreds of motorists were unable to secure a copy last year, although more than 25,000 were printed. Orders now on file will make it necessary to print an edition of not less than 30,000 this year. Your regular dealer will see that you are supplied, or

you may order direct. The price will remain the same—10 cents.

Be Sure to mention The Automobile Journal when writing to advertisers.

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TIMES BUILDING, PAWTUCKET, R. I.

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"Safe in the Grip of Multibestos"

MULTIBESTOS controls a car with the power and precision of an air brake. Never a jolt or jar but always a smooth, gliding stop that insures both comfort and safety.

Experience has proved that the greatest safety device is an efficient brake and that no brake can be called efficient if the brake lining is not firm, strong and reliable.

The enduring efficiency of MULTIBESTOS is due to a firm, close weave of the purest of long fibre asbestos and brass wire. Its powerful grip and flexible action make it in every way the right brake lining and the greatest of all safety devices.

Write for Booklet

"Safe in the Grip of Multibestos"

It will be of interest to every user of brakes.



**Standard Woven
Fabric Co.
FRAMINGHAM, MASS.**

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CHICAGO, 1430 Michigan Boulevard

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24.4 Miles per Gallon by a Six

A new high record for economy and wide range of efficiency has just been established by the Rayfield Carburetor, model G 3, attached to a stock Chandler six.

The test, officially conducted by F. E. Edwards, chairman of the Technical Committee of the Chicago Automobile Club, was made with all carburetor adjustments, including that on the dash, soldered fast. It covered four separate performances calling for very different qualities in the carburetor action, and not only did the Rayfield Carburetor prove wonderfully economical but, without change of adjustment, it showed itself also powerful, speedy, and very flexible.

What the Rayfield did on the Chandler Six without change of adjustment

1. Ran 24.4 miles on one gallon of gasoline.
2. Showed speed of over 45 miles per hour.
3. Climbed Chicago's famous Hubbard's Hill, from a standing start, on high and reached a speed of 20 miles per hour at the top.
4. Throttled down on high speed so low that for a stretch of several hundred feet the speedometer did not register.

Note: Car was a stock car in every particular, not especially prepared for the test. It carried full equipment, was occupied by four passengers and weighed 3700 with load. Tires 34 x 4. Temperature 52° at start, 56° at finish, actual specific gravity of fuel 60°.

If you want perfect carburetion you must use the Rayfield

FINDEISEN & KROPF MFG. CO.

2127 Rockwell Street, Chicago, Ill.

BRANCHES—1140 Michigan Ave., Chicago; 1211 Woodward Ave., Detroit; 1902 Broadway, New York City

THE AUTOMOBILE JOURNAL

VOL. XXXVII, No. 9

JUNE 10, 1914

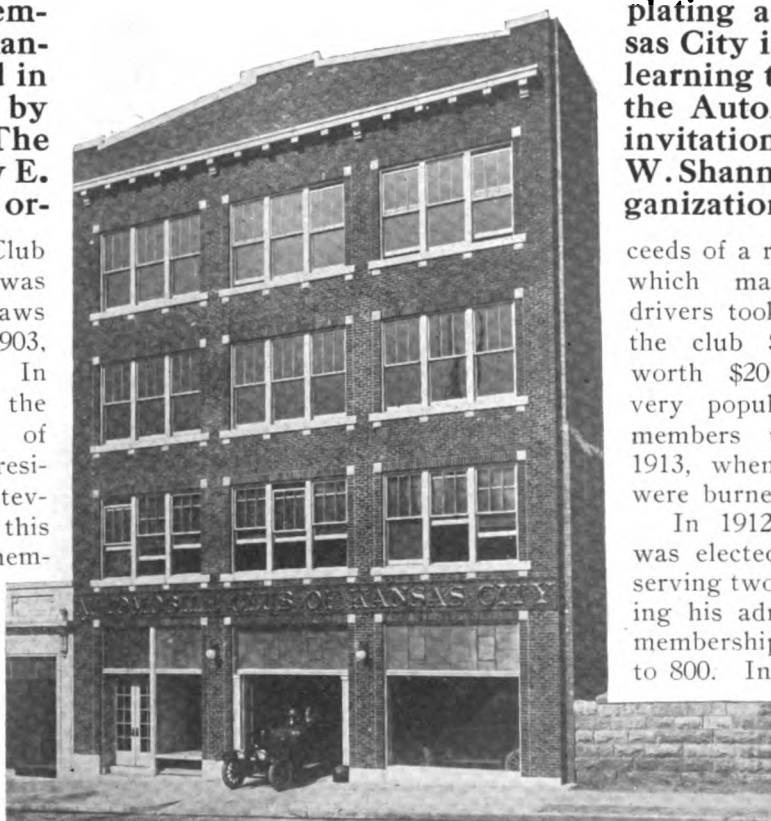
Price, \$1.00 the Year

KANSAS CITY CLUB WELCOMES TOURISTS.

Facilities of Largest Garage Outside of Boston, New York and Philadelphia Placed at Their Disposal on Terms Enjoyed by Resident Members.

Motorists contem-
district of which Kan-
will be interested in
planned for them by
of Kansas City. The
officially herein by E.
president of the or-

THE Automobile Club of Kansas City was formed under laws of Missouri, Dec. 7, 1903, with nine members. In 1907, W. W. Cowen of the Kansas City Board of Trade was elected president and W. P. M. Stevens, secretary. Under this administration the membership increased very rapidly, and the following year the club purchased 40 acres of land on the Grandview rock road, about 10 miles out of the city. This property was improved and was paid for in full out of the pro-



Front Elevation of Automobile Club of Kansas City's Down-Town Garage, at 1020 Oak Street, Which Touring Motorists Are Invited to Use on the Same Basis as Members.

plating a tour in the
sas City is the centre,
learning the welcome
the Automobile Club
invitation is extended
W. Shannon, first vice
ganization.

ceeds of a race meeting, in which many prominent drivers took part. It cost the club \$8000, is now worth \$20,000, and was very popular among the members until early in 1913, when the buildings were burned.

In 1912, H. D. Train was elected president, serving two years, and during his administration the membership was increased to 800. In the spring of 1913, a committee consisting of E. W. Shannon, H. G. Blakeley and W. G. Whit-



Secretary's Private Office: Right to Left, President W. S. Webb, Vice President E. W. Shannon, Secretary W. P. M. Stevens.

comb was appointed to secure garage accommodations in the downtown section. This movement became so popular that a contract was made with Dr. Minor for the erection of a four-story building, with basement, at 1020 Oak street. This structure was completed and occupied April 1, 1914.

Description of Building.

The garage is of fireproof construction, of brick and concrete, on a lot 49.5 by 126 feet. The floors are entirely of concrete with reinforced concrete girders, and it is maintained that it is the only garage of its size without posts.

Two entrances are provided, one from Oak street and the other from an alley at the rear. Cars are stored in the basement and on all the floors, electric elevators communicating with each. Accommodations are afforded for about 250 machines. The wash stand is located in the basement, and there is a 600-gallon gasoline tank under ground in the alley. The building is heated by steam, supplied from the city heating plant, and lighting is by electricity.

As the cars enter the building they are checked by an attendant, and placed either by the member or an assistant, as he desires. No member is given preference of position on the first floor, or on any other unless he takes storage by the month. Back of the checker's station is a stairway leading to the second floor, on which are located the secretary's private office, the assembly room for the club, a reception room for women and a wash room for men.

The garage is one of the best equipped and most convenient in the country. The writer has visited practically all the garages in Illinois, Indiana, Ohio, New York and New England, and the only ones which equal it are found in Boston, Philadelphia and New York City. The building and grounds are valued at \$90,000, and the club pays a rental of four per cent. on the investment, or \$375 a month. Dr. Minor is a very enthusiastic member, and the club was fortunate in securing such good terms.

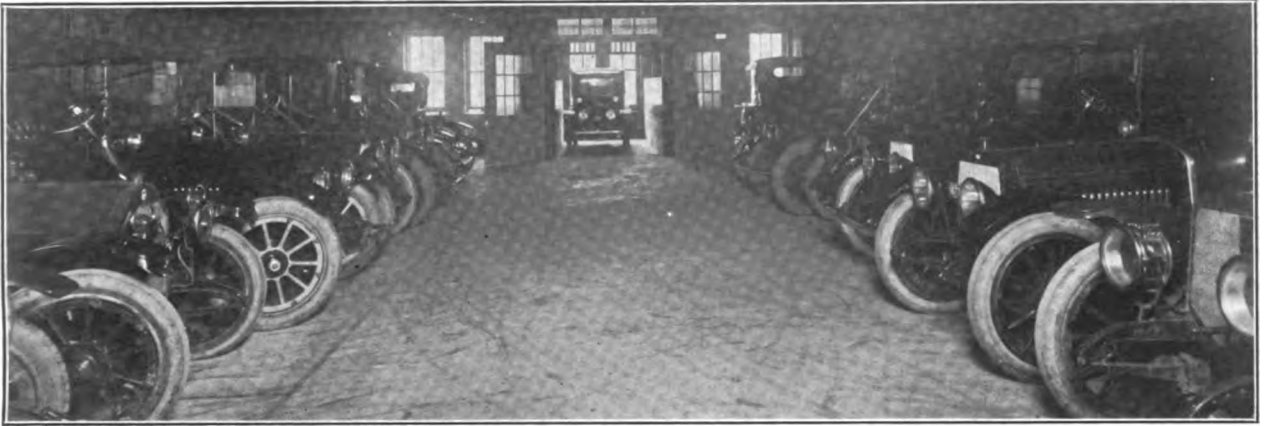
Charges for Members.

The charges are graded according to service. For each storage limited to 12 hours, the charge is 25 cents, or coupon books valued at \$5 may be purchased for \$4.50. Day storage by the month costs \$5, while storage day and night may be had for \$10. Storage for the entire year, including all membership dues, may be had for \$60. The yearly dues are \$12 and the admission fee is fixed at \$10. For washing and polishing, the charge is \$1.

While the garage service is intended primarily for members only, the directors have de-



Assembly Room of the Automobile Club of Kansas, with the Three Officers Shown in the Above Picture.



Second Floor of the Garage, Showing the Electric Elevator at the Rear—Note Entire Absence of Posts.

cided that use of the garage shall be extended also to all tourists through Kansas City, at the same rates as those charged to members, so that a tourist can put up his machine over night at the best garage west of Boston for the sum of 25 cents, and can obtain gasoline and oil at actual cost to the club. This is rather in contrast to the plan in vogue in many eastern garages, where the lowest price is \$1 a night for storage, and the highest price that can be charged for supplies. At present the Automobile Club of Kansas City is charging 12 cents a gallon for gasoline.

Trails Leading to City.

In addition, the good roads committee and touring bureau supply free information to all motorists. There are many routes through Kansas City, and throughout Missouri and Kansas good trails lead north, south, east and west. Among these latter may be mentioned the Canada, Kansas City and Gulf highway, starting from Winnipeg and leading through St. Paul, Minn.; Cedar Rapids, Ia.; Powersville, Chillicothe, Excelsior Springs and Kansas City, Mo., to Olathe and Fort Scott, Kan., and Joplin, Mo., and on to the Gulf. This highway is now being marked with 18-inch white bands around the telephone poles. Connection therewith may be made at Cedar Rapids from Chicago.

Another trail now being marked is from Utah to Indianapolis, through Colby, Manhattan, Lawrence, Kan., into Kansas City, and through Higginsville, Glasgow, Louisiana, Mo., into Pittsfield, Ill., and thence to Springfield, Decatur and Chrisman and on to Indianapolis. The poles on this route are marked

with an orange band 18 inches wide, surmounted by a black stripe six inches wide. This is known as the Midland trail.

Then there is the Old trail, marked red, white and blue, from the Atlantic to the Pacific, leading through Colorado and Kansas, Kansas City, Lexington, Marshall, Boonville and St. Louis, Mo., and on East through Illinois, Indiana, West Virginia, Pennsylvania and Maryland. Others might be mentioned, including the Sunset trail from Omaha, the Interstate trail from Des Moines, the White way from Kansas, all of which lead to Kansas City and all of which are marked.

Signs Being Erected.

To all tourists from every direction, the Automobile Club of Kansas City extends an invitation to make use of its garage and club accommodations. Signs have been made calling attention to this invitation, and soon will be erected, on all trails 100 miles in every direction from Kansas City.

A word might be added concerning the other activities of the club, these including the erection



First Floor of the Garage, with Checker's Station at the Left of the Entrance from Oak Street.

of a \$10,000 clubhouse on the 40-acre tract, to replace the structure burned last year. In addition, it is hoped that accessories, tires, tubes and insurance may be secured for members at reduced prices, and that cafe privileges may be established in the down-town clubrooms.

The officers elected in February are: President, W. S. Webb; first vice president, E. W.

Shannon; second vice president, A. D. Cottingham; secretary, W. P. M. Stevens; treasurer, Bird H. McGarvey; directors, W. C. Whitcomb, D. A. Morr, A. E. Hutchings, Frank E. Lott, E. F. Webster and Frank P. Ewins. The present membership is 900, and the officers hope to increase this to 2000 before the end of the year, and the chances of success appear very good.

ENGINEERS' MIDSUMMER MEETING PLANS.

MEMBERS of the Society of Automobile Engineers in all parts of the country are laying plans to be present at the annual midsummer meeting, which will be held this year at Cape May, N. J., June 23-27. While considerable time will be spent in professional sessions, at which reports of committees will be presented, discussions will be had on pertinent subjects and business will be transacted, the general committee of arrangements, Arthur B. Cumner, chairman, has planned numerous special events of a social nature, so that the outing will combine business and pleasure.

The programme follows:

Tuesday, June 23—Standards committee meeting at 2 in the afternoon; meeting of the board of governors of sections at 8 in the evening.

Wednesday Afternoon, June 24—Business session at 2. Address by President Henry M. Leland, Detroit, followed by report of Treasurer Hermann F. Cuntz of New York City. Election of new members, discussion on proposed constitutional amendment and introduction of new business.

Professional Session—Reports of committees. Research division, David L. Gallup, chairman; Iron and steel, Henry Souther, chairman; miscellaneous, John G. Utz, chairman.

Thursday Morning, June 25—Professional session at 9:30. Report of pleasure car wheels division, Henry Souther, chairman; "Tolerance Specified in Connection with British Standards of Rims and Pneumatic Tires", E. R. Hall; "Possibility and Difficulties of Formulating Acceptable Recommendations for One Standard Felloe Band for Wheels to Be Equipped with Pneumatic Tires", C. C. Carlton; "A General Summary of the Truck Tire Situation", J. E. Hale; report of springs division, Harold L. Pope, chairman; "Ignition and Starting Devices", A. D. Libby; "Electric Transmission for Motor Cars", J. B. Entz.

Thursday Afternoon, June 25—Professional session at 2. "The Ideal Car", discussion introduced by C. E. Davis; "Possible Weight Reduction of Cars", A. P. Brush; "Necessary Elements of Design for a Successful High Speed Motor", D. McCall White; "Motor Capacity for Motor Vehicles", C. T. Myers; report of electrical equipment division, A. L. Riker, chairman; report of electric vehicle division, A. J. Slade, chairman; report of broaches division, C. W. Spicer, chairman.

Friday Morning, June 26—Professional session at 9:30. "Tap Drill Sizes and Causes of Stripped Threads", H. E. Harris; report of motor testing division, J. O. Heinze, chairman; report of ball and roller bearings division, Howard Marmon, chairman; "A Proper Basis for Road Vehicle Taxation", C. O. Egerton and S. I. Fekete; "Proper Characteristics for Automobile Engine Oils", Prof. David L. Gallup.

It will be noted that sufficient time has been left for the social features. A banquet will be

held the evening of June 25, at which members of the society and the women of the party will be the guests of the hotel management. Wednesday evening there will be amateur theatricals, in which members of the various sections will take part. A baseball game has been arranged for Friday afternoon, and other games and tournaments are to be held Saturday.

Particular reference is made in the advance announcement to the discussion on the ideal car. It is generally conceded that the design of the average automobile would be materially different from what it is were the engineer unhampered by the dictates of the manufacturer, but exactly what a machine would be like were it based entirely on engineering considerations is to be disclosed at this meeting.

In preparation for this discussion, a number of consulting engineers and other members of the society, who are not actively engaged as designers, have been asked to give their views on this subject. In this way it is believed that the influence of commercialism will be entirely eliminated for the time being, and it is expected that ideas will be brought to light which will be reflected in the design of the future car.

Another matter that will come up for discussion is that of securing better identification for cars. Owing to the variety of shapes and sizes of license tags prescribed by the laws of the several states, as well as confusions in the manner in which these shall be displayed, manufacturers have thus far been unable to arrive at an entirely satisfactory method of mounting the plate. It is believed that owners would welcome some uniformity on this matter, and the society will endeavor to arrive at some method of securing uniform legislation on the subject.

Another feature of the meeting will be an illustrated lecture, with moving pictures, calling attention to the forthcoming European trip of the society in October and November. Opportunity also will be had to reserve passage.

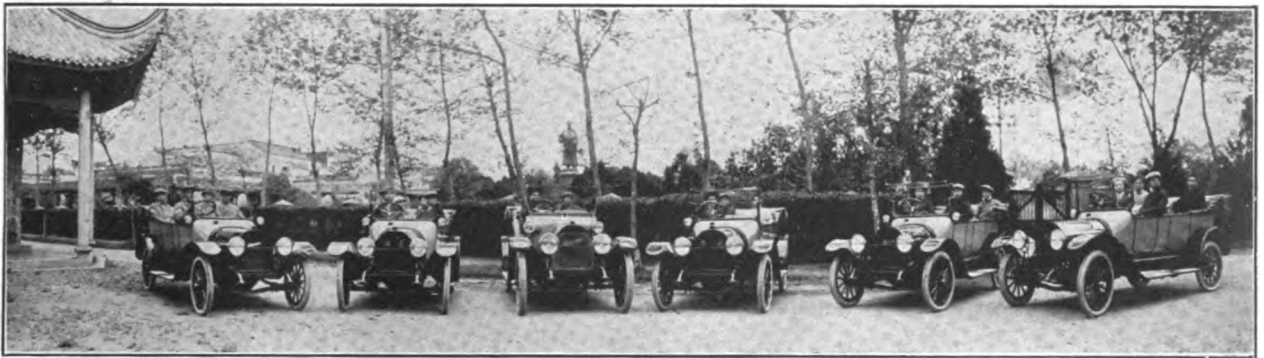
SIX STUDEBAKER SIXES IN SHANGHAI.

THE rapidity with which China is receding from its century-old habits, and taking on modern clothes, has often been pronounced one of the 20th century marvels. In no way has this progress been proven more forcibly than in the part Chinese women are taking in affairs, social and political.

A recent transaction in Shanghai bears out the above in every particular. During the past winter the widow of Soong King Dong, who, previous to his death, was compradore of the Russo-Chinese bank at Shanghai, and one of the city's wealthiest citizens, decided that, with her family, she would enjoy some of the pleasures pursued by her American sisters. So she purchased a Studebaker six from Hubert S. Honigsberg, who represents the Studebaker Corpora-

tion from west to east in a 40 horsepower KisselKar, made by the Kissel Motor Car Company, Hartford, Wis. They expect to reach New York City early in July.

Before leaving the Pacific Coast, Mr. and Mrs. Morris drove their KisselKar to the Mexican border, and, during the return to San Francisco, had a very interesting adventure. Near San Lucas, Cal., they lost the main road and decided to cross the Salinas river. There being no bridge at this point, and having been warned not to attempt to make the ford without the aid of horses, they secured the service of a farmer and two teams. While they were in the middle of the stream the towing chain broke and left them stranded with the water up to the frame of the car. Mr. Morris, being afraid that the machine



Mrs. Soong King Dong and Her Family in Six Studebaker Sixes at Fuh Tan University, Shanghai, China—Statue of Li Hung Chang in the Background.

tion of Detroit in that section of the Orient.

It happens that the four Soong sons and one daughter are married and each has a house full of little ones who are just as modern in their desires as the older folk. Each son and daughter prevailed upon the mother to buy them a Studebaker, and the accompanying illustration shows the six Studebaker sixes immediately after the five new ones were landed from the steamship Empress of Asia, at the grounds of Fuh Tan University.

TRANSCONTINENTAL JOURNEY.

Weed Tire Chain Representative Is Utilizing a 40 Horsepower KisselKar.

W. T. Morris, representing the Weed Chain Tire Grip Company, Bridgeport, Conn., accompanied by Mrs. Morris, is crossing the conti-

would settle in the soft sand, turned on the ignition switch, pressed the starter button, and to his surprise the motor started, and in a few moments had pulled out of the river under its own power. The farmer declared it was the most wonderful demonstration he had ever seen with a gasoline motor.

Leaving San Francisco, the journey was continued up the Coast through Oregon and Washington to Seattle. From the latter city they will take the trail through Spokane and into Montana, one of the most difficult passes in the Rocky mountains. Thence they will go down through Wyoming to Denver, from which point they will pursue an easterly course, crossing the Mississippi river at Clinton, Ia., and on to Chicago. From Chicago the exact route has not been determined. The trip is being undertaken for pleasure and this will be taken into consideration at all times.

THOMAS IN DELAGE TAKES 500-MILE RACE.

Wins \$35,000 in Cash and Trophies and Creates New World's Records---French Machines Capture First Four Places---Stutz First American Car to Finish.

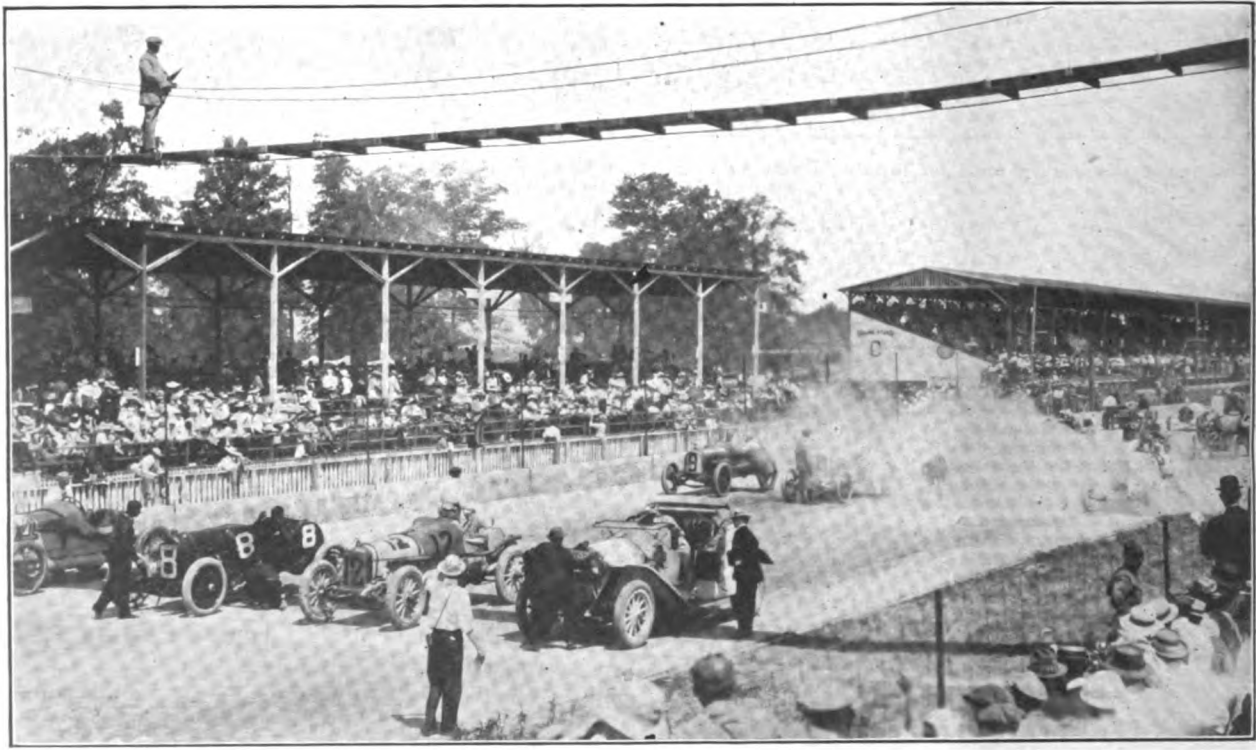
RENE Thomas of France, driving a Delage car, won the fourth annual international sweepstakes 500-mile race on the Indianapolis speedway, Memorial Day, and with it \$21,750 in cash and trophies of sufficient value to make his total winning for the day \$35,000. His time was 6:03:45.99, and the average speed of 82.47 miles an hour is a new world's record for the distance. Thomas also established new records for all distances from 300 miles.

To Arthur Duray of Paris, France, a Belgian

born in New York City, goes the honor of taking second place with the little 183-inch Peugeot, the smallest car in the race. His time was 6:10:24.49, and his average speed 80.99 miles an hour. His share of the prize money was \$10,500 in cash and sufficient trophies to bring the total of \$14,500. He secured new records for 100 and 200 miles.

The rivalry between the Peugeot and Delage teams was particularly strong. A second Delage, driven by Alfred Guyot, who drove an English

RESULTS IN THE FOURTH 500-MILE RACE				
No.	Car and Driver	Time	M. P. H.	Prizes
16	Delage, Thomas	6:03:45.99	82.47	\$35,000
14	Peugeot, Duray	6:10:24.49	80.99	14,500
10	Delage, Guyot	6:14:01.75	80.20	5,525
6	Peugeot, Goux	6:17:24.26	79.49	3,500
3	Stutz, Oldfield	6:23:51.54	78.15	3,000
9	Excelsior, Christiaens	6:27:24.54	77.44	2,200
27	Sunbeam, Grant	6:36:22.70	75.68	1,800
5	Beaver Bullet, Keene	6:40:57.82	74.82	1,000
25	Maxwell, Carlson	7:02:42.60	70.98	1,500
42	Duesenberg, Rickenbacher	7:03:34.59	70.83	1,400



Competing Cars Lined Up for the Grand Parade Around the Course at the Start of the Fourth 500-Mile Race.

Sunbeam to fourth place last year, finished third, while Jules Goux in a second Peugeot, the man who won last year's 500-mile event, finished fourth.

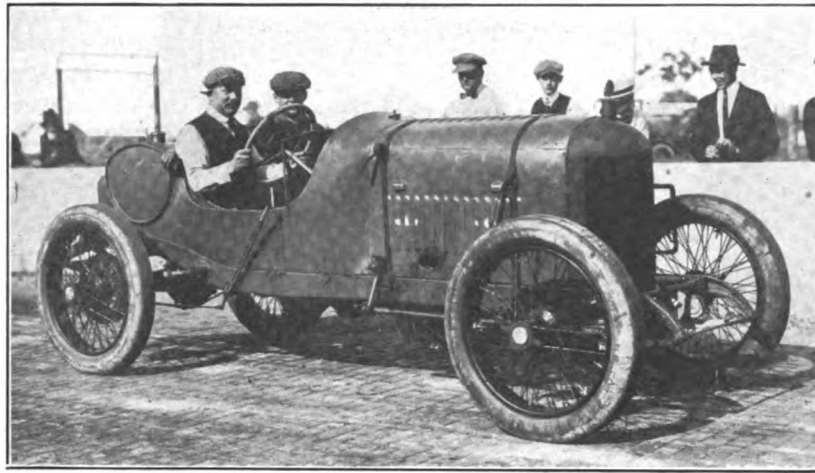
The first American car to finish was Barney Oldfield's Stutz, in fifth place. Joseph Chris-

tiaens of Belgium in an Excelsior, made in that country, was sixth, and Harry Grant of Boston, in an English Sunbeam, was seventh. Three American cars, Charles Keene's Beaver Bullet, William Carlson's Maxwell and E. V. Rickenbacher's Duesenberg, took the last three prizes. Three other cars, Ralph Mulford's German Mercedes, Willie Haupt's Duesenberg and William Knipper's Keeton, the last two American made machines, also finished, but not in the money.

Analysis of Results.

The complete story of the prize winning is told in tabular form at the beginning of this article. In connection therewith attention is drawn to the table at the bottom of this page. Comparison of the two tables will show that the first six cars to finish exceeded the speed of the winner of last year's event, and that the first four exceeded the record established by Joseph Dawson in a National in 1912. Eight of the 10 prize winners returned in less time than it took Ray Harroun to win the first 500-mile race with a Marmon in 1911.

It is interesting also to note that France took cash prizes and trophies valued at \$58,525; America, \$7500; Belgium, \$2200, and England, \$1800.



Rene Thomas and the Delage 16, Winning Combination in the Fourth International Sweepstakes Event.

Of course, while the English car won the \$1800, the sum really ought to be added to that secured by America since the machine is owned by the driver, Harry Grant, who is very much an American.

Out of the field of 45 entrants, all but two, the Tatter, and one of the Maxwells, appeared for the elimination trials. Thirty-two qualified. Ralph DePalma's Mercedes, with the six-cylinder aeroplane engine, failed to make the required 75 miles an hour on the first two trials, but qualified on the third. DePalma decided, however, that the engine was out of balance and withdrew before the start. Edwin Pullen also decided to withdraw his Mercer. Thus neither the winner of this year's Vanderbilt Cup race or of the Grand Prize took part in the event. Thirty cars started, and, as indicated above, 13 finished.

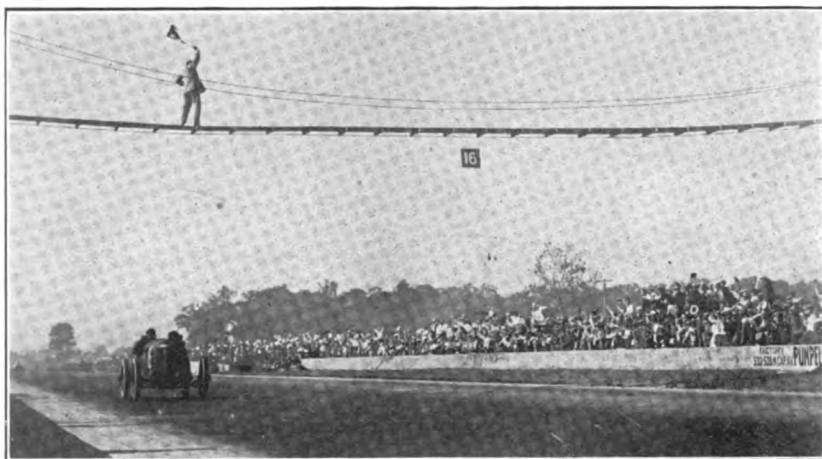
Story of the Race.

Following the practise inaugurated at the first 500-mile race in 1911, Carl Fisher, president of the speedway association, led the parade once around the course, before Starter Thomas Hay of Chicago fired the opening gun. Seven hours and 36 minutes later the last car crossed the finish line. Eleven seconds less than one hour separated the 10th prize winner from the first. Without doubt it was the greatest automobile race ever run, and this record will be one hard to beat.

Howard Wilcox and his Gray Fox was the first to cross the tape on the first lap. This position went to Christiaens and his Excelsior on the

TIME AND SPEED OF PRIZE WINNERS IN THE FIRST THREE 500-MILE RACES.

1913.			1912.			1911.		
Car and Driver	Time	M.P.H.	Car and Driver	Time	M.P.H.	Car and Driver	Time	M.P.H.
Peugeot, Goux	6:35:05.00	75.92	National, Dawson	6:21:06	78.73	Marmon, Harroun	6:42:08	74.65
Mercer, Wishart	6:48:13.40	73.49	Flat, Tetzlaff	6:31:29	76.63	Lozler, Mulford	6:43:51	74.29
Stutz, Merz	6:48:49.25	73.38	Mercer, Hughes	6:33:09	76.30	Flat, Bruce-Brown	6:52:29	72.74
Sunbeam, Guyot	7:02:58.95	70.92	Stutz, Merz	6:34:40	75.99	Mercedes, Wishart	6:52:57	72.65
Mercedes-Knight, Pillette	7:20:13.00	68.14	Schacht, Endicott	6:46:28	73.87	Marmon, Dawson	6:54:37	72.36
Fox, Wilcox	7:23:26.55	67.65	Stutz, Zengel	6:50:28	73.09	Simplex, DePalma	7:02:02	71.08
Mercedes, Mulford	7:28:05.50	66.95	White, Jenkins	6:52:38	72.70	National, Merz	7:06:20	70.37
Case, Dlabrow	7:29:09.00	66.67	Lozler, Horan	6:59:38	71.49	Amplex, Turner	7:15:56	68.79
Mason, Haupt	7:52:35.10	63.47	National, Wilcox	7:11:30	69.54	Knox, Belcher	7:19:09	68.31
Tulsa, Clark	7:56:14.25	62.99	Knox, Mulford	8:53:00	56.29	Jackson, Cobe	7:21:50	67.89
						Stutz, Anderson	7:22:55	67.74
						Mercer, Hughes	7:23:32	67.65



Thomas Crossing the Finish Line, Winner of \$35,000 in Cash and Trophies.

second, who maintained his lead until the fifth round, when it was found that Goux, last year's winner, had passed him, but this condition prevailed for only one lap. Bragg in a Mercer was now second and Thomas' Delage was in third place.

The score sheet shows that Oldfield in the Stutz was leading at 20 miles. Haupt in a Duesenberg was second, Christiaens third, Bragg fourth and Thomas fifth. There were 31 cars in the race at this point, Brock's Ray having been eliminated at 10 miles. Christiaens regained the lead in the 11th round and retained it through the 40-mile mark to the 17th lap, when Thomas supplanted him.

At 60 miles Thomas was but three seconds ahead of Christiaens, while Bragg was two seconds behind the latter.

At 75 miles Thomas was still leading, with

took the Remy trophy and grand brassard for completing 200 miles in the lead, while Thomas was in second place and Wishart in a Mercer third. The number of cars running had been cut

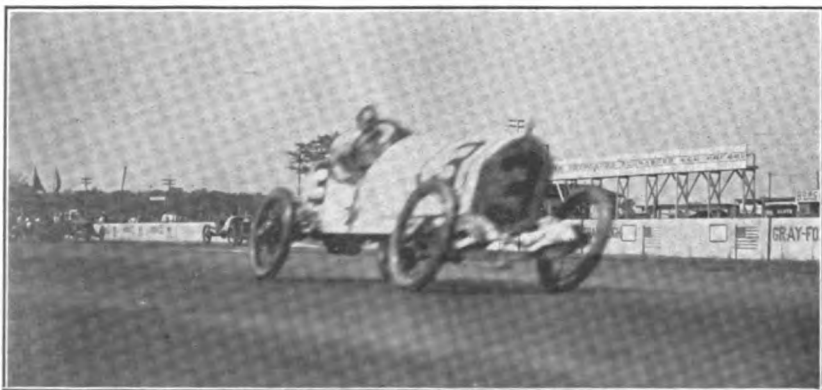


Duray and the Second Place Peugeot, the Smallest Machine in the Big Race.

to 20. The most serious accident of the race took place when Gilhooley lost a tire on his 41st lap, and collided with Dawson's Marmon. Dawson and his mechanic, Vare Barnes, were severely injured and taken to a hospital.

Duray held the lead until 260 miles had been reached, when Wishart, who had been in second place, passed him. Boillot went into second place, while Duray dropped to third. At 300 miles Thomas again appeared in first place, taking the Prest-O-Lite trophy. Wishart was second and Duray still third. Three more cars had been eliminated during this 100-mile period.

Wishart went out at 305 miles. Thomas dropped to sec-



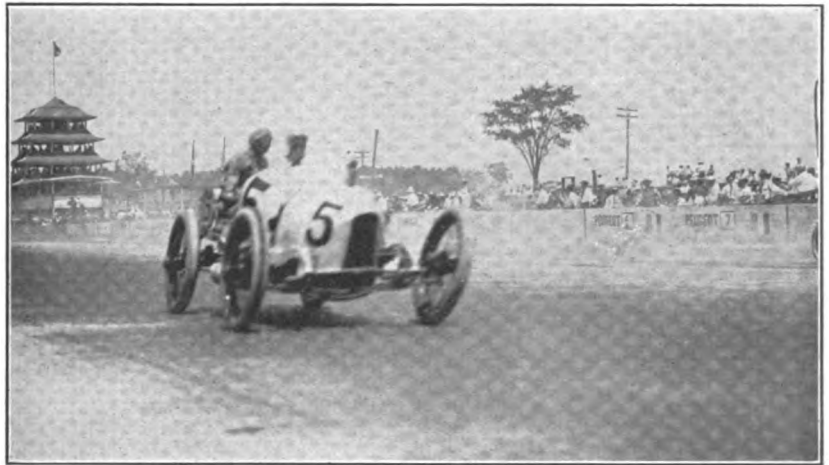
Barney Oldfield and Stutz 3, First American Car to Complete Long Grind.

ond place at 340 miles, when his teammate, Boillot, winner of last year's international Grand Prix and Coupe de L'Auto races in France, took the lead for a short time only. Boillot resumed third place at 360 miles and went out at 367.5. Thomas returned to the lead at 360, and retained it to the end. At 400 miles he took the Wheeler & Schebler trophy, and at this point the relative positions of the 13 cars remaining in the field was practically the same as at the end, although there was still some question as to the final arrangement of those running below first, second and third.

Work at the Pits.

Unusual interest centres around the work at the pits, because of the efficiency prize offered by the Waltham Watch Company for this race. It is pretty generally conceded that a contest may be won or lost at the pits, and for this reason the possibility of adding another \$500 to the prize money was a splendid inducement. However, its value would have been still further enhanced had the award not been limited to the first three cars to finish. Barney Oldfield's Stutz would have won this prize had it not been for this qualification, and thus \$500 more would have been saved to America. As matters stood, Thomas' Delage was the fortunate car.

It has been the proud boast of the Delage team that never in the racing history of that



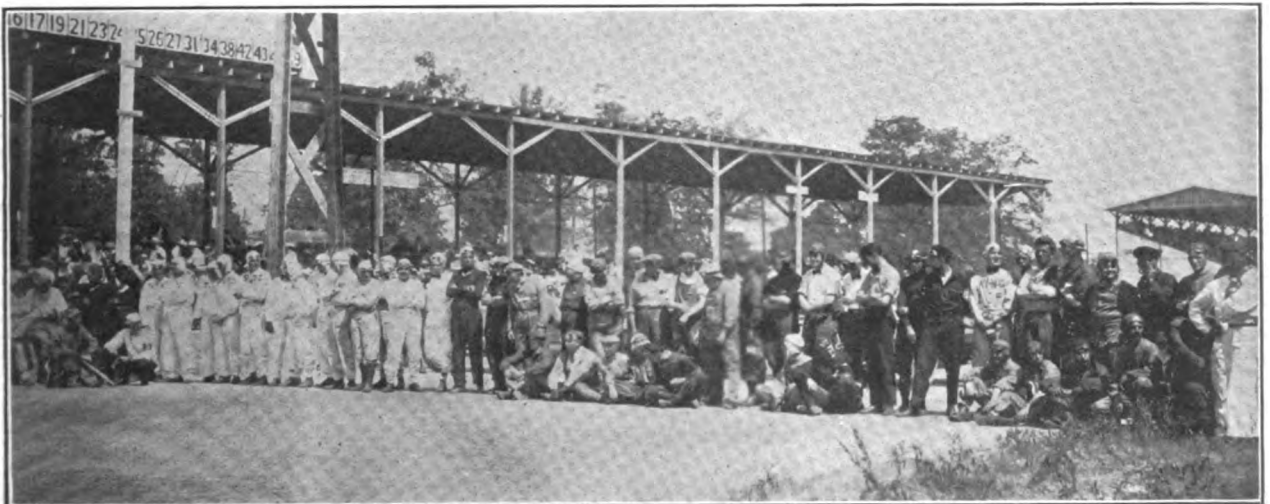
Charles Keene and His Special Beaver Bullet, Second American Car to Finish.

factory has a hood been lifted or a tool used between the start and finish. This record was again maintained in this event. Duray's little Peugeot also secured this honor, but Goux was compelled to put a new bolt in the front spring hanger of his Peugeot.

But foreign machines are not the only ones that can lay claim to such freedom from trouble. The first Stutz ever made took part in the 500-mile race of 1911, and was the only machine in that event to complete the entire distance without once lifting the hood. Cars of this make have repeated this performance time and time again, and Barney Oldfield's Stutz was the only American car in this event to complete the journey under such circumstances.

How Time Was Lost.

Oldfield's Stutz stopped but three times and lost only 3:56 at the pits. The first stop was at



The 30 Drivers and Their Mechanicians as They Faced the Camera Before Starting on Their 500-Mile Journey.



UNOFFICIAL SCORE SHEET SHOWING ELAPSED TIME FOR EACH 20-MILE PERIOD

No.	Car and Driver	Miles	20	40	60	80	100	120	140	160	180	200	220	240
16	Delage, Thomas	14:27	29:15	41:19	57:28	71:21	85:29	102:47	116:55	131:20	145:43	161:35	175:42	
14	Peugeot, Duray	14:59	29:32	41:38	56:48	70:46	84:59	99:15	113:16	130:40	145:11	159:49	173:50	
10	Delage, Guyot	14:37	28:34	41:43	57:00	71:07	85:12	99:18	113:24	127:20	150:58	165:17	179:44	
6	Peugeot, Goux	16:32	30:13	46:41	60:26	74:25	88:32	102:38	117:55	132:13	146:02	162:25	176:21	
3	Stutz, Oldfield	13:58	30:33	43:09	59:58	74:58	90:13	106:46	120:14	135:00	149:51	164:53	179:52	
9	Excelsior, Christiaens	14:21	28:19	41:22	56:50	71:14	86:01	101:03	116:35	134:13	149:00	163:55	179:30	
27	Sunbeam, Grant	15:37	30:22	48:29	66:11	80:56	96:06	110:55	126:44	145:35	160:42	175:34	193:33	
5	Beaver Bullet, Keene	14:15	31:22	46:34	62:59	77:52	96:57	112:14	127:26	147:29	160:23	176:59	191:55	
25	Maxwell, Carlson	15:40	32:15	52:19	72:53	89:53	107:57	125:06	140:21	155:14	175:04	191:03	208:30	
42	Duesenberg, Rickenb'r	15:35	31:52	46:25	59:56	74:15	91:08	106:26	123:01	138:12	155:13	169:55	187:55	
23	Mercedes, Mulford	15:20	32:11	46:22	60:58	75:57	94:02	110:53	125:55	157:29	172:14	187:28	202:51	
42	Duesenberg, Haupt	13:59	28:38	42:18	74:20	90:56	103:52	118:38	150:25	165:20	185:53	204:42	221:30	
31	Keeton, Knipper	15:37	30:22	43:00	59:58	77:43	92:59	111:24	127:30	150:50	166:35	182:22	197:50	
7	Peugeot, Boillot	14:32	29:56	46:54	60:43	75:01	92:11	107:57	121:59	135:59	150:10	162:04	176:05	
34	Bugatti, Friedrich	16:06	32:19	50:58	66:58	83:58	104:02	126:46	142:21	157:55	173:10	188:54	213:28	
1	Burman, Disbrow	14:35	29:52	42:04	59:24	74:32	90:03	105:28	121:23	149:08	166:21	183:54	200:02	
19	Mercer, Wishart	14:54	29:30	41:49	57:04	71:15	85:43	100:49	117:09	131:40	145:49	161:37	175:49	
2	Stutz, Cooper	15:15	31:36	47:00	61:59	76:52	91:55	108:15	122:50	135:32	149:59	162:39	178:51	
21	Mercer, Bragg	14:26	28:20	41:24	56:52	71:17	87:36	101:46	116:45	135:11	149:19	165:02	179:23	
15	King, Klein	15:21	30:29	49:01	64:35	81:24	96:22	111:47	127:15	142:49	159:45	out at 170 miles.		
38	Braender, Chandler	15:53	31:01	49:00	64:19	81:44	96:58	112:29	127:51	out at 170 miles.				
4	Gray Fox, Wilcox	15:03	29:39	43:48	60:11	74:40	89:18	103:39	130:35	out at 162.5 miles.				
13	Mason, Mason	17:26	37:17	55:24	68:22	83:33	98:43	112:10	131:26	out at 165 miles.				
26	Marmon, Dawson	14:55	28:58	41:24	57:07	71:25	out at 110 miles.							
17	Burman, Burman	15:26	35:30	50:09	64:41	79:29	out at 115 miles.							
24	Stutz, Anderson	14:42	29:19	41:58	57:27	76:56	out at 102.5 miles.							
49	Isotta, Gilhooly	15:38	30:28	43:21	60:49	79:47	out at 102.5 miles.							
8	Maxwell, Tetzlaff	19:33	49:58	68:48	89:48	out at 92.5 miles.								
12	Sunbeam, Chassagne	15:25	30:03	out at 47.5 mile										
48	Ray, Brock	.....	out at 10 miles.											

120 miles, for a right rear tire, gasoline and oil. It stopped a second time 10 minutes later for a right front tire, and took on more gasoline and oil. Gilbert Anderson then took the wheel, and was replaced by Oldfield after the 225-mile mark, when a right rear tire was placed, and more fuel and oil taken on.

Stops Made by Thomas.

Thomas really took second place with three stops, losing 4:55. His first stop was at 140 miles, when he changed both rear tires. He stopped again at 215 miles and changed the left rear tire. At 350 miles he stopped for water, gasoline and oil, and changed both rear shoes.

Duray's Peugeot was in third place in this

respect. He stopped but twice, once at 290 miles, when he changed two tires and filled his tanks, and again at 376 miles to change three tires. His lost time amounted to 5:03.

Christiaens also stopped twice, once at 240 miles for three tires, gasoline and oil, and again at 360 miles, apparently for a short rest, although he took on gasoline. He lost 6:17.

The other drivers who finished made the following stops and losses at pits, in the order given: Grant, five, 9:27; Guyot, three, 9:38; Goux, 10, 12:23; Carlson, 10, 18:13; Keene, 12, 23:28; Mulford, seven, 27:50; Rickenbacker, nine, 36:00; Knipper, 13, 42:27; Haupt, 15, 42:54.

As was true of the 1913 race, tire changes

DETAILS OF EQUIPMENT ON THE 13 CARS WHICH FINISHED IN THE BIG RACE.

No.	Car	Bore and Cyl.	Stroke	Displ.	Carburetor	Magneto	Plugs	Wheels	Shock Absorbers	Special Equipment
16	Delage	4	4.1x7.0	380.2	Claudel	Bosch (2)	Eyquem	Rudge-Wh.	T-Hartford	Motometer
14	Peugeot	4	3.0x6.1	183.0	Claudel	Mea	Bosch	Rudge-Wh.	T-Hartford	Motometer
10	Delage	4	4.1x7.0	380.2	Claudel	Bosch (2)	Bosch	Rudge-Wh.	T-Hartford	Motometer
6	Peugeot	4	3.9x7.0	341.7	Zenith	Bosch	Oleo	Rudge-Wh.	T-Hartford	Motometer
3	Stutz	4	4.8x6.0	432.1	Schebler	Bosch	Bosch	wood	T-Hartford	Motometer
9	Excelsior	6	3.8x6.2	446.6	Claudel (2)	Bosch	Bosch	Alex	T-Hartford	.....
27	Sunbeam	6	3.1x5.9	273.0	Schebler	Bosch	Bosch	steel	T-Hartford	.....
5	Beaver	4	5.1x5.5	449.4	Rayfield	Bosch	Bosch	Dunlop	T-Hartford	Motometer
25	Maxwell	4	4.2x8.0	448.0	Harroun	Bosch	Bosch	Houk	T-Hartford	.....
42	Duesenberg	4	4.4x6.0	360.5	Schebler	Bosch	Bosch	Rudge-Wh.	T-Hartford	Motometer
23	Mercedes	4	4.4x7.2	448.0	Rayfield	Bosch	Bosch	Dunlop	Mercedes	Motometer
43	Duesenberg	4	4.4x6.0	360.5	Schebler	Bosch	Bosch	wood	T-Hartford	Motometer
31	Keeton	4	5.1x5.5	449.4	Rayfield	Bosch	Bosch	Houk	T-Hartford	.....

*Champion plugs were used at the beginning of the race.

Cord tires were used on Delages, Peugeots, Excelsior and Sunbeam; Firestone on Stutz; Dayton, Braender and Miller on Beaver; Braender, Miller and Nassau on Maxwell; Braender on Duesenberg 42 and Mercedes; Nassau, Riverside and Michelin on Duesenberg 42, and Nassau on Keeton.

Castor oil was used by Delages, Peugeot, Excelsior and Sunbeam; Dixon's graphite lubricants on Stutz, Sunbeam, Beaver, Maxwell, Duesenbergs, Mercedes and Keeton; Monogram oil by Stutz and Beaver; Polarine by Maxwell; Oilzum by Duesenbergs and Mercedes.

DURING THE FOURTH ANNUAL INTERNATIONAL SWEEPSTAKES 500-MILE RACE.

260	280	300	320	340	360	380	400	420	440	460	480	500	M.P.H.
190:13	205:00	218:29	233:51	247:51	262:33	277:45	292:42	306:19	320:26	334:51	349:10	6:03:45	82.47
188:58	204:45	218:54	235:01	249:49	263:55	280:10	297:56	312:30	326:48	341:03	355:44	6:10:24	80.99
194:21	208:51	223:51	238:20	253:03	267:46	280:18	295:09	308:04	328:43	343:40	358:56	6:14:01	80.20
198:22	214:27	230:29	244:45	259:23	272:03	285:45	299:59	317:45	331:59	346:00	361:52	6:17:24	79.49
196:47	213:56	229:11	244:38	260:17	273:13	288:27	303:38	321:07	336:25	351:38	366:49	6:23:51	78:15
199:47	214:40	229:47	246:42	262:24	276:25	294:12	311:20	327:09	342:40	358:19	371:50	6:27:24	77.44
208:46	223:53	239:04	254:08	269:38	284:34	303:07	318:17	333:48	348:51	365:53	381:09	6:36:22	75.68
209:15	223:58	239:01	258:59	273:31	287:55	312:09	328:51	346:21	360:55	375:25	384:39	6:40:57	74.82
225:46	243:47	259:42	281:54	297:25	312:24	327:34	344:13	359:24	374:14	389:07	406:34	7:02:42	70.96
205:12	223:45	252:12	270:35	287:12	301:04	321:30	334:15	348:55	363:44	378:25	393:09	7:03:34	70.83
217:18	232:29	248:28	272:33	285:40	301:00	316:22	352:15	367:44	383:28	399:37	415:26	7:11:20	69.55
241:48	258:48	271:35	293:17	311:46	326:07	340:37	363:29	384:40	399:50	419:54	434:51	7:29:58	66.66
215:14	230:38	252:58	269:28	280:48	296:06	319:30	335:05	350:35	380:34	427:50	442:42	7:36:42	65.79
190:10	204:28	219:19	234:15	247:48	264:11	out at 367.5 miles.							
228:44	245:28	260:46	274:08	289:30	out at 332.5 miles.								
231:57	247:40	264:12	309:35	out at 327.5 miles.									
189:51	204:04	218:32	out at 305 miles.										
193:31	207:59	out at 295 miles.											
193:56	210:26	out at 290 miles.											

played a prominent part in the final result. The day was extremely hot. The race was hardly under way when Friedrich changed the first shoe on the fourth lap. It is estimated that over \$14,000 worth of tires was destroyed during the day, 138 casings having been changed during the progress of the event.

The Delage driven by Guyot had the best record with respect to tires, only two having been replaced. Oldfield's Stutz and Christiaens' Excelsior were tied for second place with three each. Thomas made five changes and he declares that the speed record set up by him will not be exceeded for some time because tires cannot withstand a faster pace.

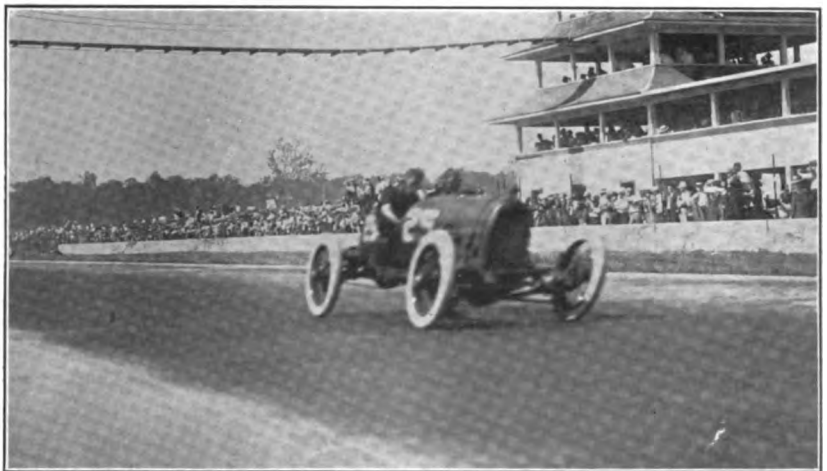
Maxwell Burned Kerosene.

In at least one respect the feature of the race was the performance of the Maxwell 25. This machine was specially designed for the Maxwell Motor Company, Detroit, by Ray Harroun, who won the first 500-mile race and who has another claim to fame in the invention of the Harroun carburetor for using kerosene. While the company had made public some of the constructional details, the fact that this machine was to utilize kerosene was kept as a guarded secret.

There is little doubt that this is the first time that a kerosene burning car has competed in a speed contest, and certainly, it is the first time that such a car has covered 500 miles under those circumstances. It is stated that the only fuel carried on the Maxwell aside from the kerosene was a half-pint priming can, which was used in

starting. Less than 30 gallons of the heavier fuel were consumed, this being of 43.3 degrees Baume gravity, selling at about six cents a gallon. Thus the expense for fuel used on the Maxwell 25 was about \$1.80. The only trouble experienced, aside from tire changes, was one blown-out spark plug.

When Harroun was commissioned to design the three cars, two of which qualified for the race and the third could not be gotten ready in time, President Flanders of the Maxwell company is said to have guaranteed a bonus of \$10,000 pro-



William Carlson Crossing the Finish Line with the Maxwell 25, the First Kerosene Burning Car to Compete in Any Race.

viding the machine should be able to make one lap of the Indianapolis course in less than 1:37. Immediately after the conclusion of the race a check for the above amount is understood to have been forwarded to Indianapolis.

The story of the race is set forth in full in an accompanying score sheet, giving the elapsed time at 20-mile periods. This score sheet is unofficial and may be revised slightly when the records are confirmed by the contest board of the

American Automobile Association. The arrangement is such that the car in first position at the various stages is denoted by bold faced figures.

How Cars Were Equipped.

Another table sets forth the equipment used on the machines finishing the race. It may be added that Thomas' winnings are made up as follows: Speedway prize, \$20,000; using Bosch magneto, \$500; Truffault-Hartford shock absorbers, \$250; Rudge-Whitworth wire wheels, \$500; creating a new world's record for 500 miles with Bosch magneto, \$500; Prest-O-Lite trophy at 300 miles, \$2750; Wheeler & Schebler trophy at 400 miles, \$10,000; Waltham efficiency prize for least time at pits among the three place cars, \$500.

Duray won the speedway prize of \$10,000, \$100 for using Bosch plugs, \$150 for Truffault-Hartford shock absorbers, \$250 for Rudge-Whitworth wire wheels, G & J trophy at 100 miles, valued at \$1500, and Remy trophy and grand brassard at 200 miles, valued at \$2500.

Guyot's \$5525 is made up as follows: Speedway prize, \$5000; using Bosch magneto, \$200; Bosch plugs, \$100; Truffault-Hartford shock absorbers, \$100; Rudge-Whitworth wire wheels, \$150. The other prizes won were those offered by the speedway management only.

MANY HUPMOBILES PRESENT.

At Least One from Each State Parked at the Speedway During the 500 Mile Race.

Thomas Hay of Chicago, who acted as starter for the international sweepstakes 500-mile race at Indianapolis, Memorial Day, is the Hupmobile distributor in his home city. When he was not busy with the contest he took advantage of the opportunity to become acquainted with some of the Hupmobile owners present, and he was very much surprised to find that there was at least one from each state in the Union parked at the speedway during the progress of the race.

He was particularly interested to note the number of tourists who visited Indianapolis from all sections of the country, and when he saw a Hupmobile enter the western gate to the speedway bearing a California number on the radiator, he took pains to learn the owner's name. He found that it was E. S. Gartland, a young rancher of Burdego Canyon, who had driven all the way from California to witness the contest.

Concerning the race itself, Mr. Hay says:

The contest from start to finish was the keenest I ever witnessed, and I am proud of the fact that I had

the honor of firing the starting gun. It will go down in motor history as the greatest automobile contest of all times.

The amount of interest shown by spectators all during the race was extraordinary. You know six or seven hours of continual watching a mile-a-minute grind gets tiresome, but the fact that the speed kings were so evenly matched made the race an interesting contest at all times.

BIG SILVERWARE DISPLAY.

Stutz Exhibition Attracts Unusual Attention During Indianapolis Race.

Selecting the international sweepstakes 500-mile race date as a most appropriate time in which to call direct attention to the creditable work of Stutz cars in the racing field, the Stutz Motor Car Company, Indianapolis, Ind., gathered in all of its racing trophies, which have been on display by its agencies throughout the country, the result being a handsome and costly exhibition of silverware at the Stutz factory.

These trophies were won in a sensational campaign covering three years, and represented victories on road, track and hill in all sections of the country. A remarkable record was established during 1913, when Earl Cooper won six out of seven events in which he was entered, earning the title of road racing champion. And it may be added that Gilbert Anderson's winning of the Elgin National trophy in August made seven consecutive long distance victories for the year.

THE NATIONAL'S RECORD.

Europe's Best Speed Creations Needed to Lower That Made in 500-Mile Race.

According to George M. Dickson, general manager of the National Motor Vehicle Company, Indianapolis, Ind., only one American automobile manufacturer has grounds for rejoicing over the results of this year's 500-mile race. He bases this suggestion on the fact that none of the American cars entered for the event were able to exceed the record for the race set by the National winner in 1912. He says:

We firmly expected our record to fall this year. It was made back in 1912, and withstood the attacks of both foreign and American cars in 1913. We have not raced since 1912, and feel proud that our record was such an internationally cherished honor that the fastest cars of Europe tried repeatedly to break it.

We also are proud that the National's record still stands as the fastest for all American made cars. I believe I can be forgiven in our pride in the fact that the National was made almost entirely of stock parts; was built right in Indianapolis after the same National methods that turn out the cars for the public, while it required special speed creations from Europe to break the record set up by it at that time.

COLE LITTLE SIX MAKES ITS DEBUT.

EVERY year, on the evening preceding the 500-mile race in Indianapolis, J. J. Cole, president of the Cole Motor Car Company in that city, is host at a dinner to which newspapermen, trade publication and magazine representatives are invited. This is one of the features of Speedway week, as the period is termed in Indianapolis, since it affords a splendid opportunity for busy men to get together, renew friendships and make new acquaintances, which would be impossible on the day of the race.

This year, Wilbur D. Nesbit of Chicago was toastmaster, and the accompanying photographic reproduction gives some idea of the esteem in which President Cole is held by the men who gather in Indianapolis to "cover" the big event. Among those whom Mr. Cole asked to meet the guests were: R. J. Firestone, head of the Firestone Tire & Rubber Company, Akron, O.; W. J. Mayo, president of the Mayo Radiator Company, New Haven, Conn.; Alvin F. Knoblock, head of the Northway Motor & Manufacturing Company, Detroit; E. C. Tibbetts, advertising manager of the B. F. Goodrich Company, Akron, O.; E. A. Walton, advertising manager of the Timken Detroit Axle Company, Detroit, and E. S. Babcock, advertising manager of the Firestone Tire & Rubber Company, Akron, O.

At the conclusion of the banquet, and as a part of the postprandial exercises, the guests were invited to inspect the full 1915 Cole line in the new Cole plant. This line comprises a four-cylinder car, a little six and a big six.

The fact that a little six had been added was not exactly a surprise, since it was known that as long ago as March, 1913, President Cole had shown his representatives such a model at a distributor's conference held at the factory. At the time, he advised against placing it on the market, as it was not thought quite up to the Cole standards. Therefore, this was its debut, so to speak, and it was on view to the public during the remainder of the week.

It is stated that the little six already has two records to its credit. Chief Engineer Charles Crawford says he has made it cover the 2.5 miles

of the speedway, with top and windshield up, at better than 60 miles an hour, and it also set up a new cross country mark between Indianapolis and Detroit. One hundred and forty-nine of these models were sold during Speedway week, 24 being driven home overland. In addition, there were 112 four-cylinder models sold, 64 being driven home, and 58 orders for the big six, of which 19 went overland.

The new line is completely standardized, each model having the Northway motor with three point suspension, Timken axles and bearings, Mayo radiator, Spicer universal joints, Gemmer steering gear, Hydraulic pressed steel frame, Detroit Steel Product Company's springs, Rich



President J. J. Cole's Guests at the Banquet Given in Indianapolis the Evening Previous to the 500-Mile Race.

tungsten steel valves, Stromberg carburetor, Delco electric lighting, starting and ignition system, Janney, Steinmetz tanks, Firestone tires and demountable rims and Cole Stewart-Warner gravity gasoline control.

The four-cylinder Cole has wheelbase of 118 inches; the little six, 120 inches, and the big six, 136. The body designs are all with the streamline effect, with deep, comfortable upholstery. The latest style Pantasote top and ventilating windshield are included in the equipment. The color scheme is a rich, dark Brewster green.

The marriage of Spencer E. Wishart, a member of the Mercer racing team, and Miss Louise McGowan, second daughter of the late Hugh J. McGowan of Indianapolis, will take place June 23. They will spend their honeymoon abroad.

PARTIN-PALMER CAR IS SUCCESSFUL.

LESS than two years ago a group of men composing the Partin-Palmer organization got together with what they believed was a big idea and the capital, brains and determination to carry this idea to completion. The men were G. H. Partin, J. B. Blackman and H. E. Graper. The idea was to build a six-passenger, 38 horsepower car embodying all the newest and most desirable features in machines that were selling around \$1200 to \$1500, but the price was to be much less than that figure. The result was the Partin Manufacturing Company, Detroit and Chicago, maker of the Partin-Palmer car.



Joseph M. Kraus, Advertising Manager,
Partin Manufacturing Company.

Every man in the Partin-Palmer organization is held to be a picked man—a specialist in his line. The intention of the officials is that he shall realize his responsibility and know that he must keep his department upon an equal working efficiency basis with every other department. The object is that not only the

advertising has been confined to trade publications, and Mr. Darnall attributes his success to three things—the quality and value of the car, the unique selling methods and the trade paper advertising.

Partin-Palmer distributors are located at Berlin, Germany; Odessa, Russia; Ashburton, New Zealand; Yucatan, Mexico; Mahuo, Sweden; Sura, Fiji Islands; Milan, Italy; Havana, Cuba; Cape Town, South Africa, and Sidney, Australia. The above are confined to those controlling large territories in foreign countries, and do not include any of the several hundred dealers handling local territory throughout the United States and Canada.

It is explained that it was the plan of the Partin-Palmer organization to put the greatest actual value into the car and place as many machines as possible for demonstrating purposes all over the world with an idea of permitting these to accomplish their own results on their own merits before entering an extensive advertising campaign. This part of the plan having been carried out, and the dealers being in a position to take care of business, it is now deemed the proper time to put the second portion of the proposition into effect.

This campaign is to be most extensive, with a view to making the Partin-Palmer car and the organization back of it known to every motorist and prospective motorist in the civilized world. Following the practise of securing men who are recognized as specialists, Joseph M. Kraus has been selected to handle this campaign. He has had a very broad advertising experience, having sold space, written copy and made a thorough study of the proposition from all aspects.

SELLING STUTZ CARS.

Announcement is made by the Stutz Motor Car Company, Indianapolis, Ind., of the appointment of Harry W. Anderson, for 3.5 years with the American Motors Company, as assistant to Sales Manager W. D. Myers. His work will be devoted largely to placing agencies for Stutz machines in the South.

Mr. Anderson is well known to the trade in the South, having done considerable work in that territory. He will shortly begin a campaign of six months' duration, which will take him into every corner of that section.

The Partin-Palmer 38 was designed by Randall A. Palmer, an engineer with many years' experience in the industry. The motor is the product of the genius of A. C. Mason, well known as a designer of Buick engines. These examples are held to be typical of the other components of the chassis.

The sales department is in charge of C. C. Darnall, who has some very radical ideas regarding selling that appear to have been a decided success. Attention is drawn by the company to the statement that he has taken a new product, unknown even to dealers, and gained a world wide distribution within a year. Most of the

MANUFACTURING ZENITH CARBURETORS.

How Components Requiring Tools as Accurate As Those Used by Watchmaker Are Made and Tested--Simplicity and Efficiency of Zenith Due to Nozzle.

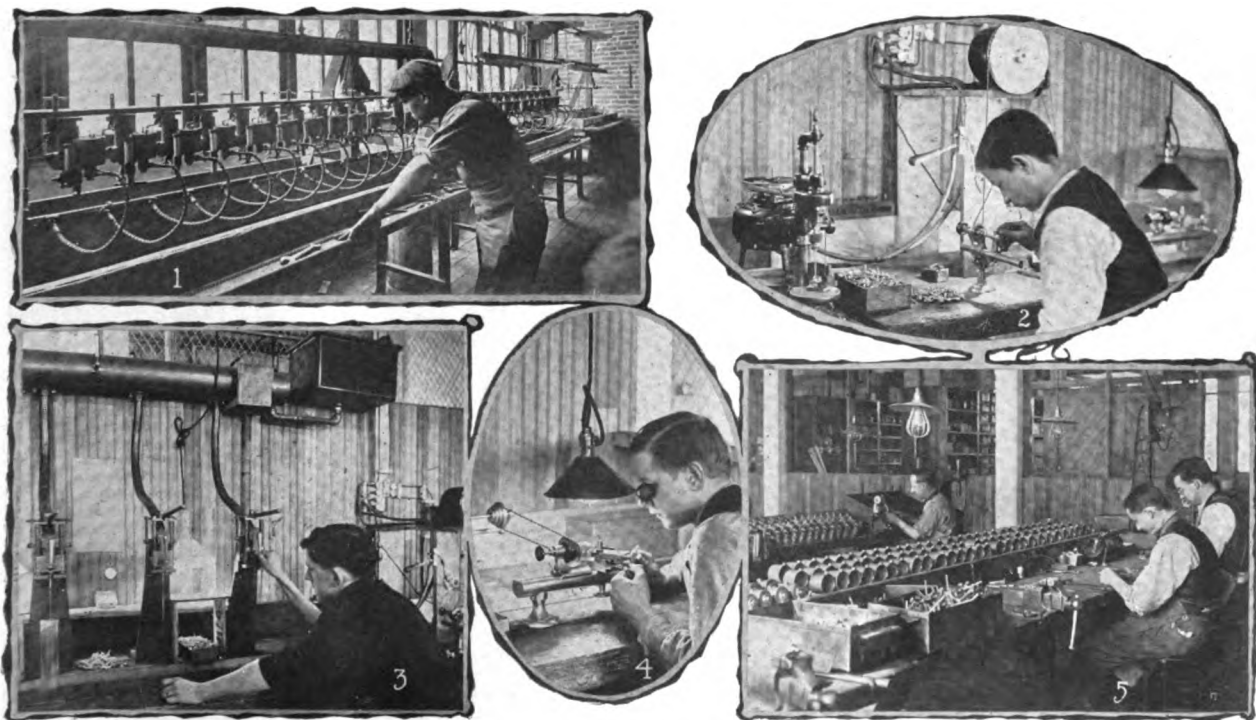
ZENITH carburetors, well and favorably known abroad, where they have received the indorsement of a large number of manufacturers of high grade machines, are now being produced in constantly increasing numbers for the American trade in the Detroit plant of the Zenith Carburetor Company, a building of steel, concrete and glass, splendidly equipped for the accurate work and tests required in high grade carburetor practise.

Although several hundred carburetors are completed and tested during the working days of the week, accuracy is not sacrificed for quantity, and each component undergoes the most rigid inspection in the various processes of manufacture. Even the raw material utilized must conform to the specifications of the engineering department, and exhaustive tests are made of each part before it reaches the final assembly. Certain components require tools as accurate as those utilized by the watchmaker. The hole in

the nozzle, for instance, must be made by a drill as accurate as human ingenuity can devise.

The accompanying illustrations depict some of the more interesting steps in the manufacture of the Zenith carburetor, that at Fig. 1 showing how the float chamber is tested. It is very important that the float and float chamber be tested under working conditions. Each spun brass float is plunged into hot water, which expands the air within, and any leaks are noted by the bubbles given off. After the floats are assembled in the float chambers they are placed in a testing rack as shown and a gasoline gauge is temporarily attached to each instrument to indicate level of the fluid. The float should occupy a certain position with respect to this level and the performance of each carburetor is carefully noted and corrected in this way. The gasoline is carried in a tank about six feet above the testing bench.

A ball gauge is utilized in the inspection of



Illustrating Some of the More Interesting Processes in the Manufacture of Zenith Carburetors: 1, Testing the Float Level; 2, Drilling the Spraying Nozzle, Requiring Great Accuracy; 3, Testing the Nozzles; 4, Special Jewellers' Lathes Utilized for Machining Needle Valves; 5, Partial View of the Assembly Department.

the air nozzle in the venturi tube, as accuracy is important. A long row of nozzles is placed on a bench as shown at Fig. 10. The "go" end of the

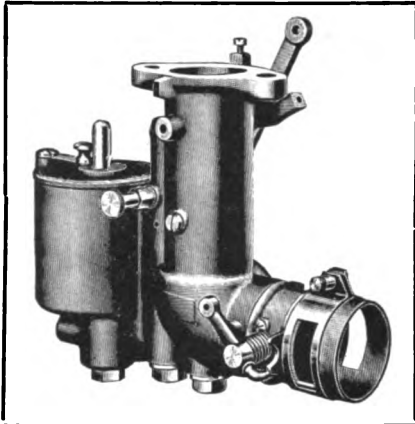


Fig. 6—Model L Zenith Carburetor.

gauge must clip through the nozzle, while the "no go" must not. The "go" end measures .7851 inch, while the "no go" end is .7898 inch. Thus there can be a variation of plus or minus about two thousandths. A ring gauge must readily slip over the outside of the nozzle without any play.

In the drilling of the spraying nozzles great care must be taken to have them absolutely correct and uniform in size. Two jewellers' lathes are utilized for this purpose, the one at the right in the illustration at Fig. 2 serving to centre the nozzle, while the small drill at the left is used to complete the operation. Many accurate operations similar to this will give the reader some idea of the skilled workmanship employed in the making of the Zenith.

Although the holes are drilled with the greatest of care, yet they sometimes vary slightly, and an infallible method is employed in determining whether or not the variation is within permissible limits. This is by means of a flow of water through the nozzle at a given pressure and time. This is testing the nozzle under conditions similar to actual operation, and a stop watch is employed when noting the level of the water in a graduated measuring tube. The variation permitted is very slight. A workman testing the nozzle holes is shown at Fig. 3.

Fig. 4 shows part of the equipment utilized for the careful machining of the needle valves which control the flow of gasoline from the float chamber. The drilling is performed by special jewellers' lathes. Multiple spindle drills are used

for drilling all of the holes in the barrel or air passage of the carburetor. The part is placed in the jig, when then accurately locates the drill points for all 12 holes to be drilled. There are almost as many sizes of drills as there are holes, and they are so arranged that the drilling of all holes with one side of the jig in position can be done in one operation, the other drills not interfering.

The main jets are drilled at the rate of two a minute. They come to the lathe man from the automatic machine which finishes the outside, but the inside must next be drilled. Fig. 5 depicts a section of the assembly department, showing a line-up of partially finished carburetors ready for the fitting of the floats, etc. Each assembler has a vise to hold the instruments in the making and the parts ready for fitting are contained in steel trays before him. The same careful attention characteristic in the production of Zenith carburetors is observed in packing them for shipment, a special box having rubber strips to hold them securely being used.

The simplicity and efficiency of the Zenith carburetor is due to the compound nozzle. There are no moving parts except the float and the butterfly valve, and there is but one adjustment, that regulating the quality of the mixture for low speed. The setting of the Zenith carburetor is the selection of the proper size of choke or venturi tube, and gasoline jets and secondary well. As these are determined at the fac-

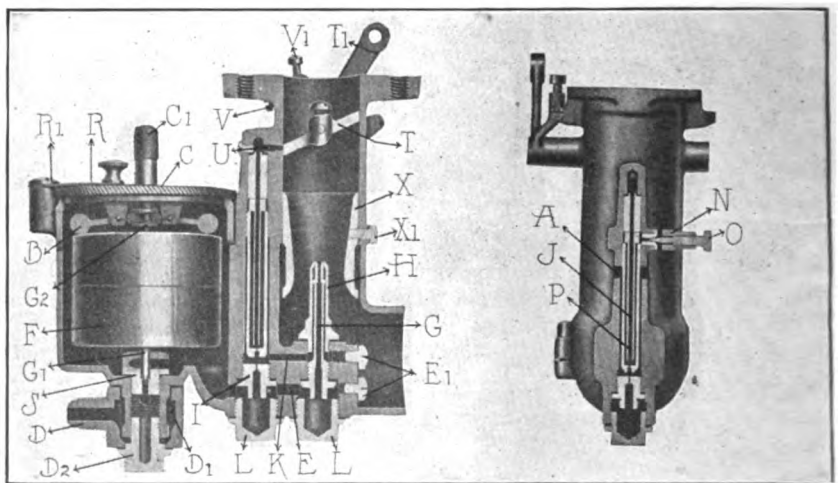


Fig. 7—Cross Sectional View of Zenith Carburetor—The Principal Parts Are: G, Main Jet; I, Compensator; X, Choke Tube; P, Secondary Well; O, Slow Speed Screw; T, Butterfly Valve; J, Priming Tube; U, Passage for Priming Fuel; F, Float; G I, Needle Valve; B, Valve Lever Weight; T I, Control Lever; J, I, K, Constant Flow Device; H, Nozzle.

tory the carburetor requires no attention after installation, and it is stated that it is as efficient in high altitudes as in low, a statement that is

borne out by the performance of Garros in an aeroplane, who attained an altitude of nearly three miles with a Zenith equipped motor.

The success of the Zenith is due to the constant flow or open well device utilized, a discovery of Baverey, the inventor of the Zenith, which is held to overcome such increase in the fuel emergence from the jet as would tend to make too rich a mixture when the piston speed increases. In other words, the mixture is practically constant.

The operation of the Zenith will be best understood by reference to the illustrations at Figs. 8 and 9. The former is a simple type of carburetor or mixing valve, having a single jet placed in the path of the incoming air, with fuel supplied from the usual float chamber. As the speed of the motor increases, so does the air, but the emergence of gasoline from the jet is augmented, resulting in a mixture which grows richer and richer. The mixture is practically constant only between narrow limits and at very high speed.

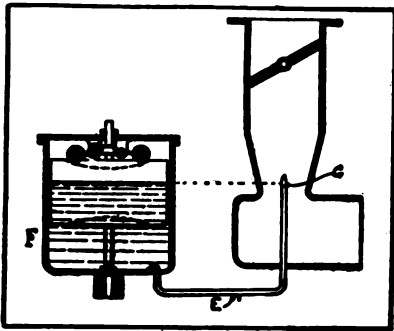


Fig. 8—Simple Type of Carburetor.

gravity only through the compensating jet I, and is not affected by the suction, as the well is open to atmospheric pressure. The flow of the fluid is, therefore, constant at all motor speeds, causing the mixture to become poorer and poorer. It will be seen that this type produces the opposite effect from the first.

By combining the two types Baverey secured the mixture balance desired, by the compound nozzle previously referred to. Fig. 9 B shows the direct suction or richer type leading through the pipe E and the nozzle G, while the constant flow device is depicted at J, I, K and nozzle H. One counteracts the defects of the other, providing a constant ratio of aid and fuel at all speeds.

In addition a priming tube J is incorporated, it extending into the secondary well P and opening at the point U of the butterfly valve as shown at Fig. 7, which depicts cross sections of the Zenith carburetor. With the butterfly valve partial-

ly open a powerful suction is exerted, providing the required rich mixture for starting a cold motor, as well as a positively measured flow of fuel

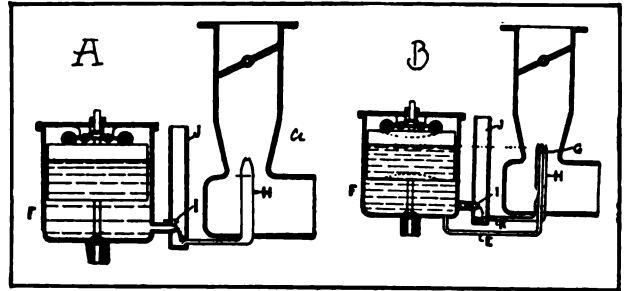


Fig. 9—Illustrating Principle of Compound Nozzle: A, Baverey Constant Flow Device; B, How Zenith Obtains Constant Ratio of Air and Fuel.

at low motor speeds when idling, for example.

The priming tube J, soldered into a brass holder G, is inserted from below, while a fibre washer on top of this holder insures tightness. The assembly is secured by screwing in the secondary well P. The lower portion of the holder or priming plug is turned down and slotted to allow air to enter through a lateral hole in the slow speed screw seat N, from which it flows around the lower part of the priming plug and into the secondary well. The secondary well P is drilled for gasoline and the supply of air can be regulated by the screw O.

The choke tube or air nozzle is held in place by a screw, and can be changed easily when the butterfly throttle has been removed. Its object is to obtain a correct gas velocity around the jets. The main jet is displaced after removing the lower plug. This jet is of the ordinary type and has a predominating influence at high speeds. The compensating jet corrects the action of the main

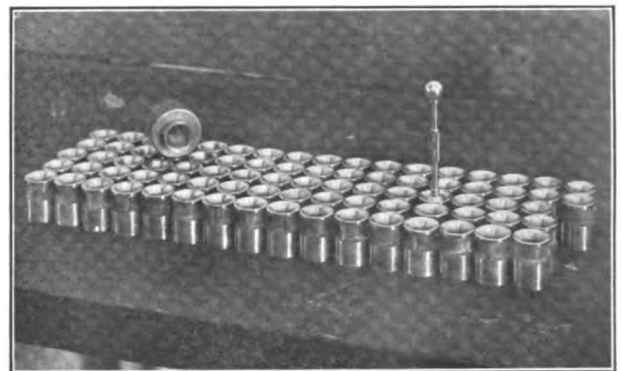


Fig. 10—The Air Nozzle in Venturi Tube Is Tested by a Ball Gauge and the Variation of Plus or Minus Is About Two Thousandths.

jet and comes into action at low speeds, as when climbing a hill. The opening of the throttle is regulated in the usual manner by a screw V, and

the position of the screw O regulates the mixture at low speed. Screwing it in enriches the mixture, and vice versa provides a leaner mixture. It will be seen that the carburetor can be readily taken apart and cleaned without changing its setting, which is determined at the factory. This applies, of course, to motors on which model the experimental determination has been secured.

The Zenith carburetor is made in five sizes, models L 4 to 8 inclusive, and with diameters

from one inch to two. A combined strangler and temperature regulator is manufactured, which is easily attached, and has a connection for the use of hot air. The company makes a carburetor for service with motors cast en bloc, and where the intake pipe is eliminated. The design differs from the standard type in the use of a horizontal mixing chamber instead of vertical and in the alteration of the low speed arrangement to suit the new condition.

SAXON TO CHRISTEN LINCOLN HIGHWAY.

ONE of the smallest cars in the industry will christen the Lincoln highway. That is to say, a Saxon car, made by the Saxon Motor Company, Detroit, and driven by M. J. Croker and Fred Wilkins, will be the first machine to cross the continent from New York City to San Francisco over this route. Officials of the Lincoln Highway Association are co-operating with the maker, and fitting receptions will be planned throughout the states crossed.

After dipping its rear wheels in the Atlantic ocean at Coney Island, June 4, the little machine

City to Philadelphia, Pittsburg, Fort Wayne, South Bend, Chicago, Cedar Rapids, Omaha, Denver, Salt Lake City, Reno, Carson City, Sacramento and San Francisco.

TRANSCONTINENTAL EMPIRE.

Famous Car Returns to Indianapolis for the International Sweepstakes Race.

With a record of 19,000 miles to its credit, Empire car No. 19, which had the distinction of being the smallest machine to participate in the Indiana-Pacific tour of last July, returned to the factory of the Empire Automobile Company, Indianapolis, Ind., just previous to 500-mile race. It occupied a prominent place in the local show-rooms of the company and was viewed by thousands during the week of the big contest.

After Joseph Moore had taken the little machine across the country, it was placed at the disposal of Pacific Coast Empire distributors as a show car, and it has been constantly on the go, adding thousands of California, Washington and Ore-

gon miles to its credit, its itinerary taking in all sections of these Coast states. Mechanically, and in outward appearance, the machine is still in splendid condition.

The annual outing of the Bay State Automobile Association, Boston, Mass., will be held June 16-17 at Rye Beach, N. H. The members and their friends will drive over the road, and a special programme of sports, etc., has been arranged.



Transcontinental Saxon Dipping Its Rear Wheels in the Atlantic Ocean Before Starting to Christen the Lincoln Highway from New York City to San Francisco.

set out on its long journey, carrying a canteen of salt water from that point to be dumped into the Pacific at the Golden Gate. It is proposed to make the trip at an average speed of 20 miles an hour. The distance is 3389 miles, and it is expected that a daily average of 125 miles will be made. Thus it may be assumed that the car will reach its destination in time to celebrate the Glorious Fourth.

The Lincoln highway leads from New York

GENERAL NEWS OF THE INDUSTRY.

General Manager Reeves Finds Manufacturers Are Having the Best Year of Their History--Changes in Personnel, New Concerns and Building Plans.

UPON his return to the New York City headquarters of the National Automobile Chamber of Commerce, from a business trip throughout Michigan and Indiana, on which he visited no less than 74 motor car factories, General Manager Alfred Reeves says that with the improvement of weather conditions the manufacturers of the industry are enjoying the best spring business in their history. That the predicted shortage of cars will soon be an established fact is borne out by his statement that most makers will complete their shipments of 1914 models by July 1 and that several concerns are even now out of cars.

March and April were record months in production and shipments. With the splendid driving weather of the past few weeks dealers have been busy getting the new machines into the hands of purchasers. The result has been numerous reorders, a condition that has been very much more prevalent this year than at any time in the past, according to Mr. Reeves.

TAKES OVER R. & L. STOCK.

Willys-Overland Company Acquires Entire Control of Selling Concern.

Last November, the Willys-Overland Company, Toledo, O., purchased an interest in the R. & L. Company, New York, although the control remained with J. T. Ranier and Paul Lineberger. It has now acquired the remaining shares and the two men named have retired as directors. It is understood that in the future the R. & L. Company will act as a service and operating company exclusively, conducting the service buildings in New York, Newark and Brooklyn. It is not stated what effect this will have on the branch house in Boston.

Ranier and Lineberger have formed a copartnership and will have the sole selling rights for Garford and Willys commercial vehicles in the same territory as before. The entire sales organization has been taken over by them. E. A. Williams, formerly president of the Gramm Motor Truck Company, Lima, O., becomes president of the R. & L. Company. C. T. Silver, New York

City distributor for Overland cars, made by the Willys-Overland Company, has taken on the Willys-Knight line.

IS GENERAL SALES MANAGER.

Alfred J. Pitts Will Direct the Distribution of Wagenhals Delivery Wagons.

Alfred J. Pitts, a well known Detroit newspaper man, has become directly connected with the automobile industry in accepting the appointment as general

sales manager of the Wagenhals Motor Car Company of that city, maker of Wagenhals delivery wagons. He has had extensive experience with automobiles, having "covered" the various motor car and motor truck concerns in Detroit for a number of years, and, in assuming his new position, he is thoroughly conversant with the history of the Wagenhals product.

The company produces a three-wheel machine which has found its way into every state of the Union and into a number of foreign countries.



Alfred J. Pitts, Sales Manager, Wagenhals Motor Car Company.

NOT SERIOUSLY DAMAGED.

Fire in Apple Electric Company's Plant Does Not Interfere with Shipments.

Early reports concerning the fire which visited the plant of the Apple Electric Company in

Dayton, O., last month, appear to have been somewhat exaggerated, in view of the fact that shipments were resumed as usual May 28. It is added that the damage was so slight as not to interfere with production.

JOINS WESTCOTT COMPANY.

A. L. Bennett, Formerly with Abbott-Detroit Line, Becomes District Manager.

A. L. Bennett, well known to the dealers in most of the cities of the East, and for the past four years eastern district sales manager for the Abbott Motor Company, Detroit, will henceforth supervise the same territory for the Westcott Motor Car Company, Richmond, Ind., with

which concern he formerly was connected. He will make his headquarters with the new Metropolitan distributor for Westcott cars, C. B. Derby & Co., 1862 Broadway, New York City.

Mr. Bennett has been connected with the industry since 1901, when he began to sell De Dietrich cars in Boston. After

A. L. Bennett, Eastern District Manager, Westcott Motor Car Company.

selling 25 of these to New Englanders at \$10,000 each, he handled the Mors line, another foreign machine, in New York City for two years. He next took up the sale of Chalmers cars, and later went with the Cole Motor Car Company, first as eastern district manager and then in the same capacity in the Middle West. After that he was with the Westcott.

TO HAVE NEW HOME.

Maker of Carter Carburetor Purchased Factory Building in St. Louis.

The Carter Carburetor Company, St. Louis, Mo., the present factory of which is located at

912-914 North Market street, has purchased the large modern plant on Spring avenue, between St. Louis and Dodier avenues, formerly occupied by the Carruthers-Jones Shoe Company. The main structure is of brick, three stories, 125 by 50 feet, and another building, 40 by 90 feet, will be put up at once.

The Carter company expects to remove to its new plant July 1. It may be added in this connection that, since the H. W. Johns-Manville Company, New York City, took over the sale of the entire production of Carter carburetors made by this concern, it has been impossible for it to keep abreast of the orders without acquiring better manufacturing facilities. It is expected that it will be possible to treble its daily output.

WILL CONDUCT TESTS.

Robert G. Pilkington Becomes Resident Engineer of American Efficiency Survey.

Announcement was made in the last issue of The Automobile Journal of the organization of the American Efficiency Survey of Motor Car Units, full details of which are promised in the near future. Now comes the information that Robert G. Pilkington, one of the pioneers of the industry, having been connected with experimental work in St. Louis in 1899, has been appointed resident engineer in charge of the tests of that organization at the Purdue University in Lafayette, Ind.

It is stated that these tests cover the working efficiency of each and every make of the various units entering into the construction of a motor car, and are to be of the most thorough and unusual type. A large amount of special apparatus designed by the members of the board of technical detail is being prepared and installed in the laboratories, one of which is a special type Diehl dynamometer. By the use of this machine, motors, carburetors, transmissions, axles, universals, etc., will be put to the most rigid examination.

It is understood that this organization will undertake to test motor car units, and place its seal of approval on such work as is submitted to it, that the general public may be assured that it is purchasing goods of the proper quality. The engineers selected are not to be connected with the industry at present, but it would appear that choice was to be made of men who are well acquainted with automobile design and construction, judging from the selection of Mr. Pilkington for the position referred to.

CONTRACTS FOR BODIES.**Budd Company Will Furnish 10,000 for New Car to Be Produced by Dodge Bros.**

The contract, under which Dodge Bros., of Detroit, has been supplying motors and transmissions to the Ford Motor Company, expired June 1, and immediately thereafter comes the information that Dodge Bros. has contracted with the Edward G. Budd Manufacturing Company, Kensington, Philadelphia, Penn., for 10,000 metal bodies, deliveries on which shall commence Sept. 1. The entire lot must be ready for delivery not later than March 1.

While it has been known for some time that Dodge Bros. was to engage in the production of cars, it was not until quite recently that information began to be made public that the machine was to compete in price with that made by the Ford company. In view of the details of the Budd contract, mentioned above, it would appear that the new machine would be ready for the market about Sept. 1.

REO CUTS BIG MELON.**Directors Declare a Stock Dividend of 50 Per Cent., Which Means \$1,000,000.**

The directors of the Reo Motor Car Company, Lansing, Mich., maker of Reo cars, have declared a stock dividend of 50 per cent., payable June 1, to stockholders of record May 28. Since the capital stock of the company is now \$2,000,000, par value \$10, this means that \$1,000,000 in new stock will be issued.

The earnings of the Reo company for the past year have been the largest in its history, it being understood that they exceeded 50 per cent. Reo stock has been increasing in value on the Exchange for several months, and during the last week in May it was quoted at \$27 a share.

PALMER & SINGER ASSETS.**Understood That Purchaser Will Market Small Car Bearing the Old Name.**

The machinery and most of the stock and parts of the Palmer & Singer Manufacturing Company, Long Island City, were purchased at the bankruptcy sale, May 25, by William Wooster of the Auto Surplus Stock Syndicate, New York City. The entire assets of the company brought between \$14,000 and \$15,000, and the

portion purchased by Mr. Wooster went for \$10,101.

It is understood that plans are under way for the production of a small car, to sell around \$450, which will bear the Palmer-Singer name, this right having been included in the assets bought by the syndicate. If possible, this car will be built in the factory at Long Island City, which was operated by the old company under lease from Chauncey Marshall.

TO MAKE HYDRAULIC TRANSMISSION.**Company Organized for This Purpose in Wisconsin Now Ready for Business.**

The Beijer Hydraulic Transmission Company, organized several months ago in Stevens Point, Wis., is understood to be ready to produce hydraulic transmissions for passenger cars and trucks, invented by Arthur A. Beijer. The officers of the company are: President, N. A. Week; vice president, James Mainland; secretary and treasurer, C. S. Orthman; superintendent and manager, A. A. Beijer.

The transmission is said to consist of a rotating cylinder pump in the flywheel of the engine and an hydraulic motor built on each of the four wheels of the vehicle. The pump and the four motors are connected by means of a series of pipes, through which oil is pumped to operate the motors, and thus the wheels. Speeds are governed by lengthening or shortening the stroke of the pump. To obtain the reverse speed the oil is pumped through the pipes in the reverse direction. It is claimed that the Beijer transmission eliminates all gears, clutches, brakes, universal joints, differential and many other complications present in the ordinary type of vehicle.

ERECTING NEW FACTORY.**Holtzer-Cabot Company to Consolidate Its Departments at Roxbury Plant.**

Ground has been broken for the erection of a new factory of the Holtzer-Cabot Electric Company, Brookline, Mass., and Chicago, Ill., on Armory street, Roxbury, Mass. It will be six stories high, with an ell of the same height, and will be of modern construction and equipment throughout. It is expected that it will be ready for occupancy early in 1915.

The Holtzer-Cabot company began business in Brookline, Mass., in 1875, specializing in electrical equipment. At that time the electrical in-

dustry was in its infancy, but the growth of the business was rapid, and when the automobile began to make itself felt in industrial fields this concern became one of the pioneers in motor car equipment. Its line includes carburetors, ignition devices, lighting systems, horns, etc. The new factory is being erected because the growth of the business during the past year has made it advisable to concentrate the various departments under one roof.

ABSORBS KINSEY COMPANY.

Willys-Overland Company Takes Over the Plant and Official Force.

The Willys-Overland Company, Toledo, O., which was heavily interested in the Kinsey Manufacturing Company of that city, has absorbed the latter concern, and it will be operated in the future as a department of the former. The Kinsey company was capitalized for \$100,000, and its officers were: President, Isaac Kinsey; vice president, John N. Willys; secretary, Homer V. Hawk; treasurer, Walter Stewart. It was engaged in the production of automobile parts of various kinds. Under the new plan the officers will become a part of the official staff of the Willys-Overland Company.

It will prove of interest, in this connection, to note that, according to current reports, based on 10 months' record, the net profits of the Willys-Overland Company for the fiscal year will reach \$6,000,000, equal to about 30 per cent. on the \$20,000,000 common stock. It is expected that a total of 45,000 Overland cars will be sold as against 31,000 in 1913.

JOINS SIGNAL TRUCK FORCES.

Howard Wilcox Acquires Interest and Will Direct the Sales Department.

Announcement is made by the Signal Motor Truck Company, Detroit, that Howard Wilcox, for 13 years connected with the industry in various capacities, has acquired an interest in that concern and will act as consulting engineer and director of sales. He has had wide experience in the truck field and his many friends will be glad to learn of his new venture.

Mr. Wilcox formerly was connected with the manufacture and distribution of Reliance trucks, and later with the General Motors Truck Company, when that concern took over the Reliance Motor Truck Company. He also is understood

to have had a large part in developing several features of the Kelly line. He designed the Standard three-ton truck and helped to organize that company, and was for a time consulting engineer for the Federal Motor Truck Company.

GETS FOREIGN CONTRACT.

Continental Motors Will Be Used by British Manufacturer in New Car.

Because of the strong feeling with respect to goods which are British made, it is of unusual interest to note that the Continental Motor Manufacturing Company, Detroit, has secured an order for 5000 motors to be used by W. R. Morris of the W. R. M. Motors, Ltd., of Oxford, England, in the production of a new machine which that concern will place in the British market. The motor which will be used is known as the Continental model U, with bore of 2.75 inches and stroke of four.

While Morris is British born and bred, he is a man of unusual courage, it would appear, since he is willing to defy British traditions in contracting for nearly \$1,000,000 worth of material. It is stated that the company expects to produce about 100 cars a week, which may be regarded as another innovation in British motor car manufacturing circles.

TO MAKE ELECTRIC STARTERS.

New Concern, Organized in Detroit, Absorbs Disco Company of That City.

The American Electric Starter Company has been organized in Detroit, with capital of \$250,000. It is understood that the moving spirit is Mansell Hackett, head of the Disco Company, which has been absorbed by the new concern. The other incorporators are T. G. Murton, N. M. Guy and J. E. Olsen.

As the name would imply, the company will engage in the production of electric motor starters, and it is stated that the design will comprise a single unit machine, having ignition, starting and lighting functions. Joseph Lamb is said to be the inventor.

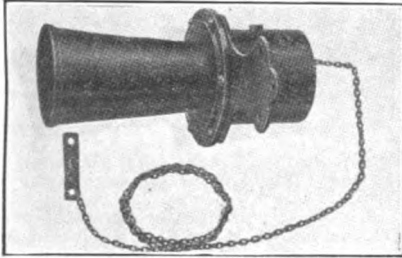
A recent dispatch from Detroit contains the information that contracts already have been consummated with the maker of the Krit, Paige, Brockville-Atlas, the last named being a Canadian concern, and some others. It is added that special types will be produced for Packard cars.

NEW ACCESSORIES FOR THE MOTORIST.

THE CABLEPHONE.

A Mechanically Operated Horn Actuated by a Cable.

The Automobile Supply Manufacturing Company, 220 Taaffe place, Brooklyn, N. Y., maker of horns, announces a new design, which differs materially from conventional practice. It is a manually operated horn, but instead of being actuated by moving a lever, the signal is obtained by means of a cable. The Cablephone, as it is termed, is located at the side of the dash, and leading from it to the steering wheel or other convenient location, is a cable. A slight pull on the cable operates the horn, which is of the mechanical type. The design is moderately priced, comes complete with all necessary fittings and is guaranteed for three years.



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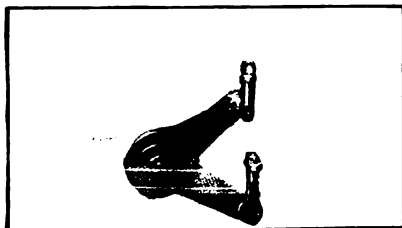
FORD SHOCK ABSORBERS.

Connecticut Design, Same as Utilized on Large Machines.

The Connecticut Shock Absorber Company, Meriden, Conn., maker of the shock absorber of that name, is manufacturing a special design for the model T Ford automobile. The same principle as that used with the absorbers made for large machines is employed and the workmanship and material are in keeping with the high grade established by this concern.

Three absorbers are utilized with the Ford car, one in front and two at the rear. The method of mounting the front member is shown in the accompanying illustration, and it will be noted that the design makes for easy attachment, being secured as it is, to the axle and cross frame member. The rear members are fitted by means of a bracket bolted to the outside of the frame and an axle clamp to the axle housing. The clamp is prevented from moving by the use of a V shaped bar.

In the Connecticut design, one arm is integral with the case containing a



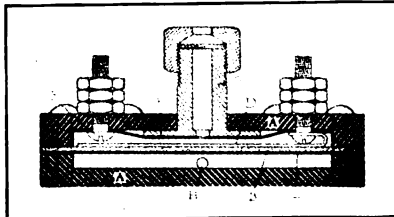
triangular set of springs, and the other is attached to a three-faced cam which turns between the springs. The absorbers are set so that the springs are slightly deflected, permitting unrestricted motion of the cam in one direction, but checking the movement in the other. It is this principle that allows the car springs to perform their function of compensating for inequalities of the road, while all reaction is checked.

PRICE CUT-OUT SWITCH.

Automatically Cuts Out Horn and Electric Lighting.

John R. Price & Co., Basic City, Va., has brought out an ingenious device for preventing the operation of the electric horn or lighting system when the motor is not running, thereby locking these members against tampering. The Price automatic cut-out switch, as it is named, utilizes the pressure or suction of the intake manifold or pipe to actuate it.

A sectional view of the device is shown in an accompanying illustration with the various components lettered. It is a simple electric switch,



comprising a strip or blade of special electrical copper D, which is normally out of contact with the contact piece E and terminal.

The spring is enclosed in a cylindrical chamber or fibre case A, which also contains a flexible leather diaphragm B, backed by a water proof oilcloth C. A protecting strip F is also utilized. The switch side of the chamber is connected by a small copper tubing G to the intake manifold, and the opposite side is provided with a vent H.

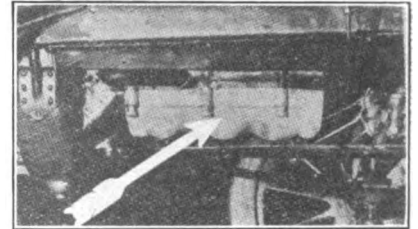
It is stated that a very slight suction, about two ounces to the square inch, will cause the circuit to close through the spring member making contact with the terminal contact. It is claimed that the action of the device is not affected by vibration, and that, as the circuit will be opened when the suction ceases, waste of current is prevented when the motor is stopped and when the driver forgets to turn off the lights. The Price device weighs but three ounces, is 2.25 inches square and is sold with a one-year guarantee.

The editor wishes to acknowledge the receipt of several cuts for use in this department. Some were too large, being in excess of 2.0625 inches, the width of the column utilized. As previously stated photographs or half tones are preferred. Cuts will be returned after use, if so desired.

GARDNER ENGINE BASE.

For Ford Cars and Replaces Conventional Member.

The Gardner Engine Starter Company, 1455 Michigan avenue, Chicago, is manufacturing the Gardner auxil-



lary engine base designed for the model T Ford motor. One of the qualities emphasized is that it makes possible engine repairs without removing power plant from the chassis. The device is machined to fit accurately and as a further precaution against oil leakage is equipped with cork gaskets.

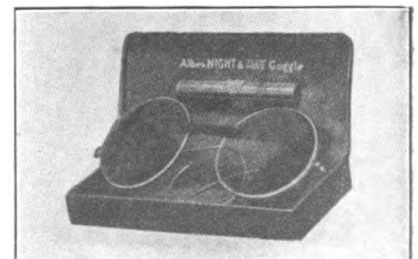
The maker states that new rings can be installed and the cylinders inspected with the Gardner base, and that connecting rods, etc., may be reached easily and adjusted in considerably less time than ordinarily.

NIGHT AND DAY GOGGLE.

Includes Lense for Eliminating Glare of Headlights.

T. A. Wilson & Co., Inc., Reading, Penn., has brought out a new automobile goggle which presents practical features, in that its construction provides for eliminating the blinding effect created by powerful electric headlights. It is called the Night and Day goggle, and comprises all the desirable features of the ordinary goggle and, in addition, has an extra segment in the top of each lense. The small and lower section is of light amber, and the vision through this portion is for ordinary driving. The top lense is of dark amber, and is made smaller than the other member.

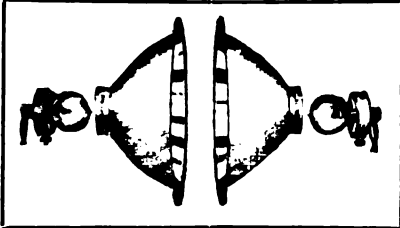
When the driver is confronted by dazzling headlights at night he simply tips his head to bring the vision through the dark segment, which so reduces the glare that the approaching machine and roadway can be seen with perfect clearness. A feature of the design is the use of a soft silk bridge band, adjustable to the face.



FORD ELECTRIC HEADLIGHTS.

A. H. Kling Company Marketing New and Practical Design.

The A. H. Kling Company, Detroit, distributor of accessories for the model T Ford car, is marketing a



special design of electric headlight for this machine. The feature of the design emphasized is that the bulbs may be removed and new ones inserted without disturbing the reflector proper, as will be noted by the accompanying illustration, which depicts the attachments displaced from the lamp. This arrangement enables securely mounting the reflector.

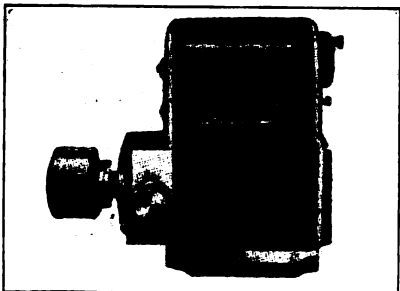
Another feature of the equipment is the use of a quick make and break, flush type of switch, and it is held that it is positive in its action. The wiring connections are made on the hood side of the dash, and the leads and connections are high grade in every particular.

NEW-LITE LIGHTING DYNAMO.

Designed for Ford and Other Small Automobiles.

The New-Lite Manufacturing Company, Newton, Ia., is marketing a complete electric lighting system for small cars such as the Ford, Metz, etc. The system includes a belt driven generator, storage battery, headlights and tail lamp, dash switch, wires, connectors, etc. The outfit comes ready for installation.

Drive is taken from the usual fan pulley, one belt being utilized for the fan and the generator. The dynamo operates at six volts and is provided with an automatic cut-out. Provision is made for carrying the battery on the running board, a steel box with lock being included in the equipment. The lamps are finished in black and nickel, the headlights being eight inches in diameter and equipped with 15 candlepower mazda bulbs. The tail lamp is of two candlepower. Bullet side lamps are supplied at a slight extra cost. It is



stated that the system may be installed on a Ford car in two hours, the generator being mounted on the left hand side of the motor by means of a plate bolted to the cylinder head.

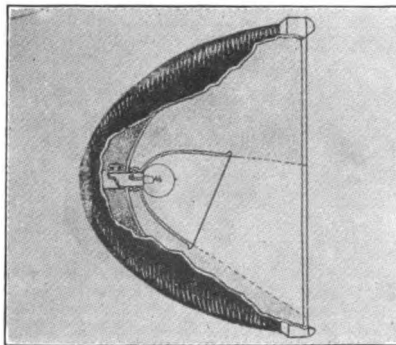
The generator is very compact, and throughout the best of material and workmanship has been incorporated. Its output is stated to be sufficient to supply all requirements, and the bracket utilized for mounting the generator is well designed. Complete details of the system will be supplied upon request.

LEGALITE REFLECTOR.

Eliminates Glare of Headlights by Novel Construction.

The Legalite Reflector Company, 1503 Bryant avenue, Bronx, New York City, has brought out a novel device for eliminating the glare of headlights. As will be noted by the cut-away illustration presented herewith, an auxiliary reflector is utilized, and this is positioned at a downward angle.

This projects the rays in such manner that the top of the beam is parallel with the ground, while the bottom of the beam strikes the ground close to the car. The small or auxiliary reflector is constructed to snap



on over the Ediswan socket that ordinarily is fitted to electric headlights, when the bulb may be put back in place.

The maker states that the device may be slipped on or off easily, and that after being fitted it cannot work loose or change its position. It comes in sets of two and is inexpensive.

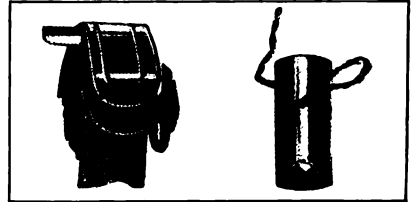
With electrifying the gasoline car the motorist is provided with a number of devices making for comfort and convenience, to say nothing of equipment that saves considerable time. Particular reference is made to the inspection or trouble lamp. Formerly these units were such that when their use was desired it was necessary to attach terminals.

Today inspection lamps may be purchased having means for plugging in to convenient place on the dash, etc., as the maker of the car provides such connections. Some designs are equipped with a self-winding reel, eliminating the work of winding up the cord after the work is completed. An ingenious trouble lamp is that provided with a magnet, making it possible to attach it to any metal portion of the car, a construction which is decidedly convenient.

LITTLE GIANT TROUBLE LAMP.

A Combination Unit Including Magnetic Lifting Device.

The Harding Specialties Company, 755 Boylston street, Boston, and 1339 Michigan avenue, Chicago, maker of



the Boston tail light detector, is marketing the Little Giant magnetic trouble lamp.

It is a combination device, providing as it does an inspection or trouble lamp and a magnetic lifter. It will stick to metal, and the accompanying illustration depicts the device attached to the mudguard of a car, supplying the operator with light for making a change of a casing, for example.

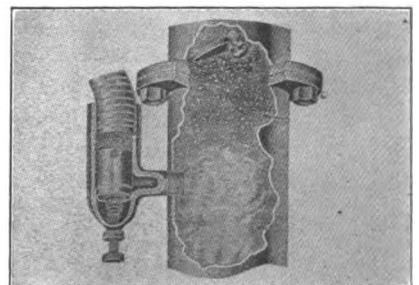
One of the qualities of the device is that nuts, bolts, etc., dropped in places not easily accessible by the hands or tools, can be recovered easily, as the pull of the magnet is sufficient to lift ordinary tools. The Little Giant magnetic trouble lamp is inexpensive, and as above stated, can be made to serve a number of useful purposes.

PEERLESS FUEL SAVER.

Introduces Heat into Intake Pipe Above the Carburetor.

The Peerless automatic gasoline saver is manufactured by the Peerless Motor Specialty Co., Inc., 1779 Broadway, New York City, for which the Harding Specialties Company, Inc., 755 Boylston street, Boston, is sole distributor. It is held to save from 25 to 40 per cent. of fuel, increase the efficiency of the motor, reduce carbonization to minimum and assist in starting.

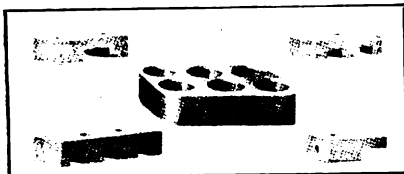
The design differs from the usual application of heated air, in that the heat of the exhaust is utilized above the carburetor. A flexible metal tubing is connected with the saver, which is tapped into the intake manifold as shown. The hot air is injected and controlled automatically, and is supplied according to the demands of the motor. The heat thus introduced vaporizes any particles of fuel existing in the mixture.



AMERICAN FIBRE CLEATS.

Made in Shades and Used to Secure Wiring on the Car.

The American Vulcanized Fibre Company, Wilmington, Del., manufacturer of hard and flexible vulcan-



ized fibre, kartavert and laminar fibre, is producing a large variety of vulcanized fibre cleats, some of which are shown in the accompanying illustration. These comprise a design having a single groove for twin or parallel wires, one for corners, for triple wiring, etc.

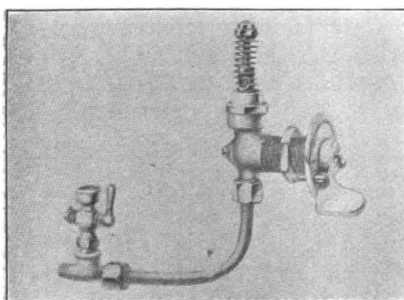
The company produces cleats which are not only compact and neat in appearance, but in shades to make them inconspicuous in places where appearance is considered. They are strong and durable and make an excellent substitute for wood and porcelain members. The value of fibre as a non-conductor of electricity is well known. The high-tension wire cleat shown in the centre of the illustration is designed especially for motors. The American Vulcanized Fibre Company also manufactures gears, etc.

AUTO-VALVE FUEL SAVER.

Extra Air Supplied Is Controlled by an Automatic Valve.

The Auto-Valve gasoline saver, manufactured by the Crary Company, 652 Woodward avenue, Detroit, is a simple device comprising two parts, a control lever mounted on the driver's side of the dash, which opens and closes an automatic air valve under the hood, and a connection to the intake manifold just above the carburetor. The function of the device is to admit extra air into the intake pipe, making for a homogeneous mixture, as well as to economize on fuel, etc.

The dash lever is operated after the motor becomes warm, permitting the piston to draw in extra air, thereby reducing the amount of fuel emerging from the jet of the carburetor by lessening the suction. It is pointed out that the stream of air encountering the mixture breaks it



up, and that more energy is obtained from the explosion.

After turning on the air by the dash lever the automatic valve controls the supply of air, this being according to the speed of the motor. A priming cup is included in the equipment, located near the intake manifold, and it may also be utilized for introducing kerosene into the cylinders.

STRYKER STARTER FITTING.

Provides Means for Introducing Fluids into Cylinder.

C. W. Stryker, 240 Shonnard street, Syracuse, N. Y., is manufacturing the Stryker starter fitting, which is designed for the model T Ford and other makes of motors in which provision has not been made for the fitting of petcocks or means for introducing gas or fluids as is necessary with some forms of motor starters.

The Stryker device is constructed much in the same manner as the shell of a spark plug, but differs in that it is made much thicker at one side, this section being indicated at B in the illustration. The lower part C is threaded and this is screwed into the cylinder, replacing the usual spark plug, which is threaded into the opening at A. The member B is also



threaded and into this is screwed the starter connection or a petcock for priming purposes.

FUEL ECONOMIZERS.

During the past year there have been placed upon the market a large number of fuel economizers, and sometimes these devices include a priming attachment. There is no doubt that these fuel savers, as they are often called, are productive of the results claimed for them when installed properly and used intelligently.

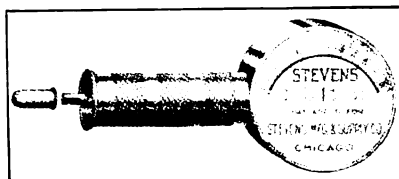
The majority provide for introducing air into the intake pipe above the carburetor, thereby assisting in carburetion, as well as breaking up any particles of fuel not completely vaporized by the usual carbureting means. Others utilize the heat of the exhaust to attain the same end. It is obvious that where the design of the carburetor is such that the proper mixture is not obtained, at medium and high speeds, for example, control of the air is a decided advantage.

The priming attachments above referred to will appeal particularly to those owners whose cars are not equipped with petcocks.

STEVENS PRESSURE GAUGE.

Indicator Remains Set After Pressure Is Registered.

Too much emphasis cannot be laid upon the importance of keeping the tires inflated to the pressure recom-



mended by the maker and for the particular size casing employed. Over-inflation is held to be as bad as under, and the best method of determining the pressure is to utilize a gauge, which is not expensive.

The Stevens Manufacturing & Supply Company, Fisher building, Chicago, is marketing the Stevens auto tire pressure gauge, which is provided with special connections to fit any tire check valve marketed, and is guaranteed to register with perfect accuracy. The indicator remains set after the pressure is registered, enabling removal of the gauge and its reading at leisure. All gauges are tested before leaving the factory and an adjusting device is incorporated for correcting any lost tension in the spring occurring after considerable service.

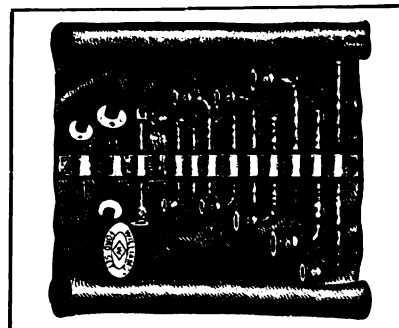
WILLIAMS FORD WRENCH SET.

Fits All Nuts and Bolts, Including Cylinder Head Members.

J. H. Williams & Co., Brooklyn, N. Y., maker of drop forgings, has brought out a wrench set for the model T Ford car, and one of the qualities of the outfit is that all wrenches are accurately milled. The wrenches in this selection have been thoroughly tried out and are drop forgings, case hardened.

They will provide adjustment for a large number of bolts and screws, including the cylinder head members. They will fit U. S., S. A. E. and A. L. A. M. standard nuts and cap screws, the opening varying from .25 to .5625-inch.

The maker states that the wrenches will permit of removing and replacing nuts and bolts not accessible with the usual tools.



SPARK PLUG GAPS AND MOTOR EFFICIENCY.

THERE was a time when the motorist was obliged to pay more or less attention to the ignition of his car. That was in the days of the

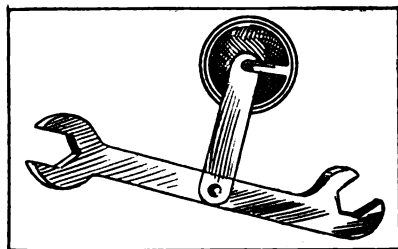


Fig. 1—Using Splitdorf Magneto Gauge to Set Plug Gap.

battery, coil and timer system. Batteries would deteriorate, coils required adjusting and points had to be kept clean and true. and commutators and distributors had to be cleaned, oiled and adjusted. While the old systems had their disadvantages, requiring as they did periodic attention, they taught the motorist the importance of maintaining the correct spark plug gap, a factor much neglected in these days of magneto ignition, and one that the writer holds is of much importance.

This contention is borne out in the instructions given by magneto manufacturers for the proper maintenance of their equipment, and a careful perusal of any maker's instruction book will result in finding a paragraph dealing with the spark plug gap. The Splitdorf Electrical Company, for example, states that the best results are obtained with its equipment when the gap is .03125 inch. The Eisemann Magneto Company, and the Bosch Magneto Company, recommend a gap of .015625 inch. The Remy Electric Company states that different motors require varying gaps and that about .025 or .030 inch is best for the average engine, but if it misses at low speeds when running idle or pulling heavy, particularly at slow speed, the gaps should be decreased.

The last named conditions are frequently encountered and generally prevail when the plugs have seen considerable service. Much depends, of course, upon the plug utilized; that is, the material employed for the sparking points. The general tendency is to utilize a metal that will resist the burning effect of the high-tension current, as well as to make the points larger. With plugs having points constructed of soft material it is obvious that in time the gap will be augmented.

When it is considered that several thousand volts in excess of the voltage produced by the

battery or magneto are required to overcome the resistance at the gap of the spark plug, the importance of maintaining the proper space will be readily understood. The actual voltage needed is shown in the chart at Fig. 2, the diagram depicting the electromotive force required to bridge a .02-inch gap with various compressions. The compression of the motor is a factor, and it is a well known fact that a spark that appears good in the open air may not be sufficiently strong to ignite the mixture when under compression. Referring to the chart, it will be noted that over 12,000 volts are required to overcome the resistance above referred to.

Setting the spark plug gap by guess work is not to be commended, nor is the use of a 10-cent piece reliable, as the thickness of the coin varies according to wear. A gauge is to be preferred, as it is accurate, and every owner of a machine fitted with a magneto should make it a rule to utilize the gauge supplied with it for setting the points. That made by the Splitdorf Electrical Company and the method of its use is shown at Fig. 1. These gauges are utilized to set the contact points of the Splitdorf magneto, which require a break of .03125 inch, the correct distance for the gap of the spark plug with many ignition systems. The gauge is not expensive and is accurate.

In setting the points it is well to examine the negative member or electrode integral with the shell, for it may be so burned that a recess is formed. When such is the case the point

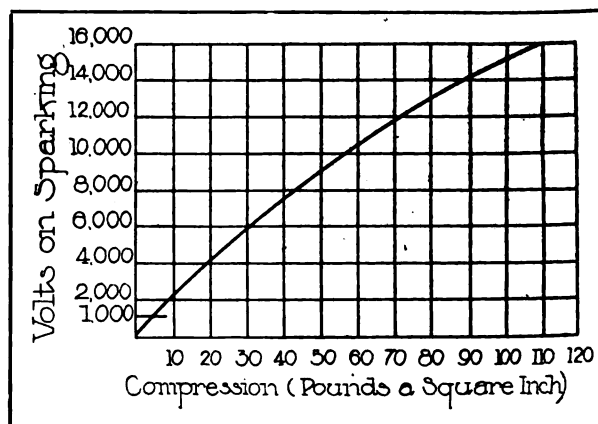


Fig. 2—Curve Showing Voltage Required for High-Tension Current to Bridge a .02-Inch Gap with Various Compressions.

should be filed until the surface is true, otherwise the gap will be .03125 inch, plus the depth of the recess.

TEXAS CYCLECAR HAS NOVEL FEATURES.

IT IS not exactly clear just what connection the Wichita Falls Motor Company has with the cyclecar produced in its factory by Enio Salminen, an employee of that concern. The company was organized some two years ago for the purpose of manufacturing Wichita Falls motor trucks, a line which has met with decided success in the Southwest. In the letter accompanying the photograph, which is reproduced herewith, Walter H. Ilg, sales manager of the concern, states that it has nothing whatever to do with the two cyclecars which have been made by its employees, T. T. Lane and Enio Salminen. However, the description presented is that supplied by Mr. Ilg.

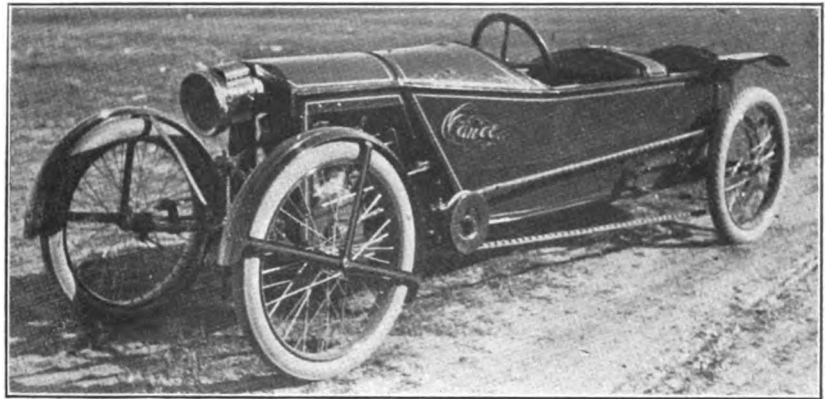
It will be understood that the illustration is that of the machine produced by Mr. Salminen. It has wheelbase of 105 inches and tread of 36. Its weight is 550 pounds. The two passengers are seated tandem, with the driver in front. The motor is a nine horsepower, twin-cylinder, air-cooled De Luxe, evidently of the true cyclecar type. The planetary transmission is mounted on the jackshaft, drive from the motor being by chain from a small sprocket on the flywheel to a larger member on the jackshaft. Final drive is by 28-degree V belts to the 16-inch grooved drums on the rear wheels.

Special reference is made to the steering arrangement. Both axles are tubular, that at the front being pivoted in the centre and resting on a heavy coil spring both top and bottom, from which point the body is suspended, as indicated in the illustration. It is maintained that this construction permits the axle to turn through an angle of 45 degrees before the body assumes a different position, and that the springs employed take up the vibration and inequalities of the road.

The steering is accomplished by means of a drum at the forward end of the steering post, over which a cable is wound and passes through pulleys at a right angle to the front axle, to which it is fastened at each side. This steering operates the entire front axle, no steering knuckles being employed. It should be explained, as well, that the hand wheel describes a semi-

circle only, a radical departure from conventional practise. The evident reason for this lies in the desire to provide ample leg room, necessary because of the low angle of the steering column.

It will be noted that the body, which is of steel over a wooden frame, is suspended at three points—on the coil spring arrangement in front, and two cantilever type springs at the rear, these latter being supported at the front end on spring shackles. Ball bearings are used in the jackshaft and in the wire wheels. The tires are 28 by three inches. A 3.5-gallon fuel tank is located at the cowl dash, and in the beetle back compartment back of the rear seat are carried the Prest-O-Lite tank and the tool kit. The equipment also includes a single acetylene headlight, etc.



Texas' First Cyclecar, Produced by Enio Salminen of Wichita Falls.

This first car has been in daily operation since Thanksgiving Day, and is said to have proven very efficient and satisfactory over the rough roads in that section. It is added that it has attained a speed of 55 miles an hour and shown a fuel consumption of 45 miles to the gallon.

BILLIKEN GROWS UP.

It is understood that \$25,000 has been subscribed by residents of DePere, Wis., to secure the Milwaukee Cycle Car Company for that city. The concern has been producing the Billiken cyclecar, designed by Stanley S. Eigel, but it is stated that the plans will be changed so that the future product will be a standard motor car, although it is expected that the construction will be simplified in every respect. DePere capitalists are said to be very much interested in the project, and expect good returns on the investment.

TRANS-ANDEAN MOTOR TRANSPORTATION.

Chilean and Argentine Governments Expected to Subsidize Plan Developed as Result of Buick's Recent Successful Journey from Coast to Coast.

COMING so soon after the completion of the first transcontinental automobile journey across South America, made by Johnson Martin in a Buick machine, a detailed description of which appeared in the issue of *The Automobile Journal* for May 10, the news that the Chilean and Argentine governments are considering the advisability of establishing a regular line of motor transports through the Uspallata pass in the Andes from Los Andes, Chile, to Mendoza, Argentina, is of particular interest to American motorists and to the industry in this country. The scheme was projected by Wiedgan & Cia. of Valparaíso.

It will be remembered that Martin's account of his trip indicated that considerable work will need to be done on the Argentine end of the route, while the road between Los Andes and La Cumbre (the summit) is fairly good. It is believed that, even with good roads entirely through the pass, it would prove practicable to attempt transportation only between October and March or April. (In this connection, it is well to remember that the seasons in South America are directly opposite to those in North America, so that the period mentioned would include the summer months.)

The plan is to establish a syndicate under government subvention to build and maintain the roads, and carry on the transportation of passengers and freight. It is understood that Wiedgan & Cia. would undertake the formation of this syndicate under a government guarantee on a capital of 750,000 pesos (Chilean gold), or about \$273,750 in American money. This concern estimates that 60,000 pesos (\$21,900) will be required to place the Argentine portion of the road in condition for motor traffic. The distance between Los Angeles and Mendoza is 148 miles.

The Chilean government already owns the Trans-Andean Railway, which is administered by the Buenos Aires & Pacific Company, in connection with the Argentine Trans-Andean Railway. Inasmuch as the proposed motor transportation line would act to reduce the freight and passenger tariffs, all three of these companies are interested in the project. Negotiations already have been under way looking toward a reduction of

freight tariff on the railroad from 15 to 20 per cent., and the Buenos Aires & Pacific Company has suggested that 40 per cent. of this reduction be borne by the Chilean company and 60 by the Argentine company.

The Mendoza provincial government has been asked for a subsidy to build the portion of the road between the city of Mendoza and La Cumbre, since it is maintained that this province will benefit most largely by the motor transportation plan. The entire project has been laid before the national congresses of Chile and Argentina, and it is expected that it will meet with speedy indorsement.

In case this should prove true, and the syndicate is granted the subsidies for which it asks, there will be a market for a number of motor vehicles. It is proposed to utilize motor 'buses capable of carrying 12 or more passengers, and trucks with capacity for 17,600 pounds of freight. Because of the successful trip of the Buick, an American automobile, it is expected that American manufacturers will receive the first opportunity for supplying the necessary vehicles.

WHITE 'BUSES IN URUGUAY.

Three Machines Have Been Operating for Entire Year with Splendid Success.

In connection with the proposed scheme for motor transportation over the Andes, it is of interest to note that the Albatros Autobus Company of Montevideo, Uruguay, has been operating three White 'buses between that city and Pando, a distance of 35 kilometers (21.73 miles) since June 1, 1913, with splendid success. The company has a garage at 18 de Julio and Andes, Montevideo, which is the starting point, and another in Pando, each having facilities for caring for three machines. However, the schedule is so arranged that there are never more than two 'buses at either end of the line.

The road over which the run is made consists of about four kilometers of asphalt, four of stone pavement, and the remainder of fairly good macadam. The scheduled time for the run is 1:30:00, and four trips are made each way daily.

between 7 in the morning and 6:30 in the afternoon. On Sundays and holidays, two extra trips are made. The run is divided into four sections, and the fare is 30 cents for one section, 40 for two, 50 for three and 60 for the four. None of the machines has ever missed a trip.

DELIVERS ROYALTY'S ORDERS.

Willys Utility Wagon in the Service of Baker at Heidelberg, Germany.

"Made in Germany" has almost the same weight with Germans as "Made in Great Britain" has with British subjects. Moreover, there has been decided opposition on the part of German automobile manufacturers to the so-called American invasion. In fact, it was within the year that United States consuls stationed in the German empire felt constrained to make complaint concerning the character of advertising that was appearing in trade papers in that country.

In view of this situation, it is of particular interest that Emil Roesler, a baker and confectioner in Heidelberg, the seat of the great university and one of the numerous palaces of the Emperor, has purchased and placed in service a Willys Utility wagon, made by the Willys-Overland Company, Toledo, O. The fact that this is an American made machine does not appear, thus far, to have worked any hardship upon his business, since the car regularly calls upon several members of the royal family.

NEW BODY MATERIAL.

French Coach Makers Find Fibromonolith Has Desirable Qualities.

As is true of all foreign countries, the French chassis maker does not produce the automobile body, except in a comparatively few cases. This

work usually is done by a separate branch of the industry, which is continuously striving for something new. Among the latest announcements of the French coach maker is the body made of fibromonolith.

This new material is a cement containing powdered wood, and is said to be unusually hard and tough. In use, strips of split cane are attached to the wood side frame members of the body, and panels of wire cloth are nailed to these. The cloth is given whatever curve is desired by hammering, and then the fibromonolith is applied in a wet paste with a trowel. The material enters the mesh and comes in contact with the split cane and wood frame to which it adheres quickly.

After it has dried and set, it can be smoothed on the outside by planing and sandpapering.



Willys Utility Delivery Wagon Used by Emil Roesler, Baker and Confectioner, of Heidelberg, Germany, to Serve Royalty and Other Patrons.

Thereafter it may be simply varnished, in which case it shows a leathery grain, characteristic of the substance and held to be entirely satisfactory. It may be treated as wood, however, and painted and varnished in the same way. Or coloring matter may be mixed with the paste in advance, if desired.

Among the advantages claimed for the substance are: That it is incombustible and insensible to the action of water, heat or cold; that it is non-vibratory and therefore silent; that a body formed in this manner has no joints and moldings, may be shaped in the coating substance wherever desired and so as to be integral with the structure, and that repairs may be made as readily as placing patches on a plastered wall.

TESTING FUEL LEVEL OF CARBURETOR.

ATENTION to apparently minor details makes for economy in the upkeep of a motor car and manufacturers now supply instructions for caring for components that formerly were considered unimportant. For example, the Cadillac Motor Car Company in its instruction book calls the attention of the owner to the need of testing the fuel level in the carburetor and the tension of the air valve spring. Reference is made

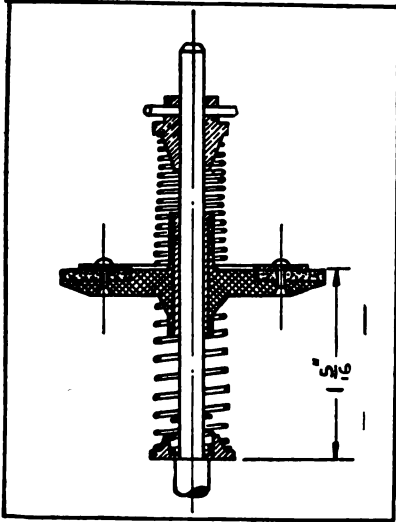


Fig. 1—Testing Air Valve Spring of Carburetor.

to this particular type to indicate the need of occasionally inspecting the components of the carburetor, for the lack of flexibility and power may be due to normal wear.

After a carburetor has been in service for some time there may be a slight amount of wear at the point of the needle valve and its seat, as the valve is subjected to considerable work, controlling as it does the supply of fuel to the float chamber. If worn the level of the gasoline will be higher than intended by the maker, and if this condition exists it should be corrected.

With the Cadillac carburetor the level of the fuel is tested by removing the bowl or float chamber from the carburetor, removing the spraying nozzle, and attaching the bowl to the fuel supply pipe. When the chamber is held in a perfectly level position the distance from the top of the bowl to the gasoline should be from .65625 to .71875 inch. If less than the first named distance correction may be made by bending down slightly the arm A, shown in Fig. 2. If the float has to be removed, shellac the screw at B to prevent its working loose.

With many carburetors an auxiliary air valve is utilized and this should open as the motor begins to speed up. It is utilized to compensate for the extra amount of fuel which emerges from the jet when the throttle is opened and the suc-

tion consequently is increased. Springs that have seen considerable service may lose their tension and with some makes it is better to replace with new than attempt to remedy the faults of the old one.

The suggestion made for testing the air valve spring of the Cadillac carburetor shown at Fig. 1 is as follows: Remove the small cover over the air valve by displacing the two small screws retaining it to the body of the carburetor. Next take out the small cotter pin near the top of the air valve stem and remove the latter complete with springs from the adjusting nut. Hold the air valve as indicated in the sketch. The distance from the leather face of the air valve to the under side of the collar on the air valve stem as shown should be 1.3125 inch. If more than this new springs should be substituted.

Relative to the position of the float, it is possible that too low a level of the fuel is due to the float being heavy. This condition is generally due to the cork absorbing a certain amount of the fuel. Before bending the arm to which it is attached, remove the float and dry it thoroughly, then give it one or more coats of shellac. If, after replacement, the level is not in accordance with that prescribed by the maker, bend the arm carefully. Some types of carburetors provide for adjusting the float.

Those motorists who adjusted their carburetors for easy starting in cold weather should cut down the fuel supply, as the relative flow of the gasoline is considerably faster in warm weather than in cold. In adjusting the carburetor it

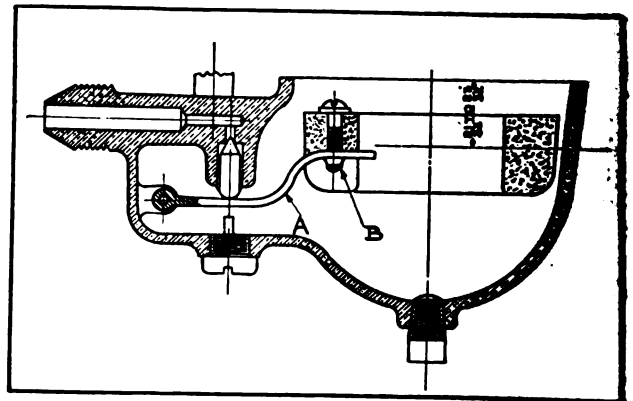


Fig. 2—In Testing Level of Fuel in Float Chamber of Cadillac Carburetor the Spraying Nozzle Is Removed.

should be borne in mind that warm weather has the effect of not enough air, directly the reverse of conditions existing in cold weather.

DETAILS OF THE CLEVELAND CYCLECAR.

AFTER several months of experimentation, the Cleveland Cyclecar Company, Cleveland, O., recently announced a roadster model of the true cyclecar type. It is understood that this machine presents English lines, the designer, Robert Clark, having formerly been employed as an engineer with the Daimler Motor Car Company and the Humber Motor Car Company, Ltd., both of England. During his stay with the latter concern he was actively connected with the design and production of the Humberette.

Before going abroad Mr. Clark was employed as machine shop superintendent for the Columbia Motor Car Company, Hartford, Conn., and later as chief inspector for the F. B. Stearns Company, Cleveland. Associated with him in this latest enterprise are W. E. Burnes, formerly with the Royal Motor Car Company and later with the Stearns, and W. H. Noyes, who also was with the Stearns, but before that with the Garford company.

The Cleveland cyclecar has a four-cylinder, water-cooled motor of the L head type, rated by the maker at 10-16 horsepower. The bore is 2.25 inches and the stroke four, giving a piston displacement of 63.6 cubic inches. Cooling is by thermo-syphon, lubrication by constant level circulating splash, ignition by magneto and the carburetor is a Mayer.

Fourteen-inch friction discs give variable speeds, these being governed by hand lever, while a foot control releases the discs. Final drive is by V belts. Brakes are internal expanding on six-inch drums, operated by ratchet foot control. Springs are semi-elliptic in front and quarter-elliptic in the rear. Ball bearing wire wheels are employed, these being fitted with 28 by three-inch tires.

The body is of metal, seating the driver at the left, and is with baggage space in the rear. The wheelbase is 96 inches and the tread 36. The weight is not given. The equipment includes a top, windshield, horn and tool kit.

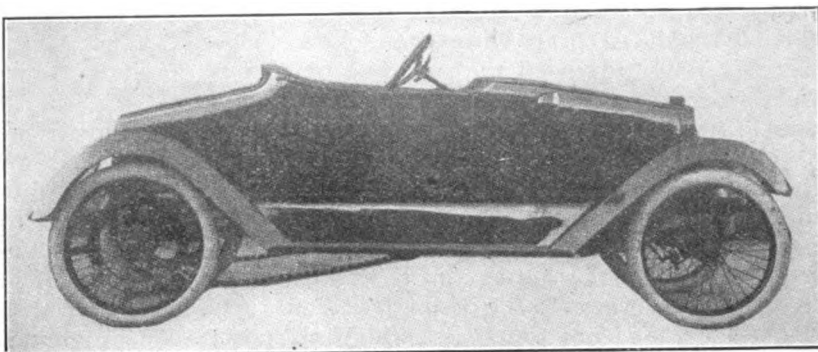
As stated above, several months have been devoted to experimentation, and the officials of the company believe they have a thoroughly practical machine. The tests are said to have

demonstrated that it is capable of speeds up to 50 miles an hour.

UNIVERSAL LIGHT CAR.

New Machine Announced by Pennsylvania Concern Capitalized for \$1,000,000.

The Universal Motor Company has been incorporated in Washington, Penn., with authorized capital of \$1,000,000, for the production of the Universal light car. The officers of the concern are: President, R. M. Paxton; vice president, J. H. Donnan; treasurer, J. B. Allison; directors, A. M. Linn, J. H. Donnan, A. C. Warne, J. D. Bigger, C. S. Caldwell, R. M. Paxton and J. I. Brownson.



Cleveland Cyclecar Is Held to Be Designed Along English Lines.

The machine is properly termed a light car, under the rules of the Cyclecar Manufacturers' National Association, being equipped with a four-cylinder, water-cooled motor of the block type, with bore of 2.81 inches and stroke of four, giving a piston displacement of 99.67 cubic inches. This is rated at 18 horsepower. Lubrication is by constant level splash, maintained by plunger pump. Ignition is by Splitdorf magneto.

The three-speed transmission is mounted as a unit with the motor and the cone clutch. Springs are semi-elliptic in front and three-quarter elliptic in the rear. The rear axle is semi-floating. Wheels are of wire, with 28 by three-inch tires.

The equipment is most complete, including a top, curtains, ventilating windshield, electric lights and starter, electric horn, generator, storage battery, pump, jack and full set of tools. The two passengers are seated side by side, with the driver at the left. The wheelbase is 96 inches.

CORRESPONDENCE WITH THE READER.

Marsh Rims—New Reader, Germantown, Penn.

In a recent argument between two old time motorists I heard reference made to the Goodrich and Marsh rims, one holding that the former was much easier and quicker to change than the latter. Being interested in such matters, would be pleased to have your opinion, also a description of the two types.

The types of rims referred to were largely utilized previous to the adoption of the universal

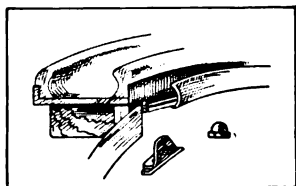


Fig. 1—Sectional View of Marsh Rim.

type and both possessed merits. The Marsh rim shown at Fig. 1 comprised three removable rings, two of which were utilized to retain the casing, and the third as a locking member. The last named was split and was held in place by a wedge shaped piece which was slipped over a threaded bolt integral with the felloe. This wedge served to prevent the split ring from contracting and from leaving the felloe. The wedge was locked in place by an acorn shaped nut.

To remove the rim this nut was displaced and the small ring sprung out. Then the ring next to the casing was displaced, which permitted the tire to be slipped off. To replace, this order was reversed. With the Marsh rim it was essential to keep the ring next to the casing free from rust, else it had a tendency to freeze to the rim proper.

The Goodrich rim is shown at Fig. 2, the sketch being made by the writer from memory, and while the details may vary slightly, the illustration will serve to explain its operation. The design consisted of a rim having a detachable split ring, which is shown in its normal position at A. To remove and replace it a special tool was employed, one end having a screw driver point, while the other carried a stud. Pivottally mounted on the same end was an arm carrying a stud.

To take off the rim the point of the tool was inserted in the slot and the rim forced inward, then upward to disengage the locking device. The last named member and the recess into which it was fitted are depicted at B and C respectively.

After mastering the construction it was a simple matter to replace the ring correctly. Some owners employed a hammer and a punch, but the writer, who has had considerable experience with the design, has made changes very quickly with the tool referred to. If the valve was

pushed well up the locking section of the split ring would go into place easily by inserting the studs of the tool in the holes shown in the ring at A, and giving the tool a quick pull or push, according to the manner the tool was held. This drew the free end of the ring toward the other section, which was prevented from slipping by a stud fitting into the hole shown at C.

It is a matter of individual opinion as to which was the better rim. The writer has made a number of changes with both types and found that a quicker and easier replacement could be made with the Goodrich. Some motorists, however, pinned their faith to the Marsh.

Ball Checks—Reader, Ashaway, R. I.

Some time ago you printed in the notes for owners an account of how to fit a priming device to a Ford car, and stated that it could be used to admit extra air into the intake pipe as well. I have mislaid the copy of the book and wish to fit the device to my car. I remember the plan, but am not sure whether it was necessary to use a ball check. A friend of mine says it will be needed. Please advise me.

The article referred to dealt with a dash priming device comprising a petcock and copper tubing. The intake manifold above the carburetor was tapped to take a nipple to which the tube was fitted. The construction permitted of placing a small amount of gasoline in the petcock, thereby wetting the walls of the intake manifold and providing a rich mixture for starting.

By opening the petcock slightly, or to its maximum, extra air is introduced, an advantage

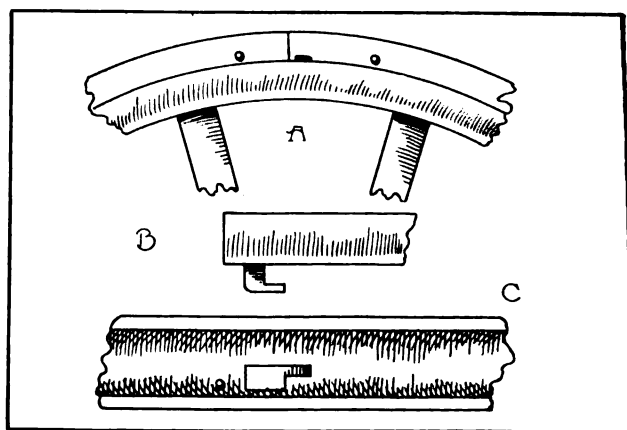


Fig. 2—Goodrich Quick Detachable Rim: A, the Split Ring in Place; B, Locking End of Ring; C, Showing Recess into Which B Was Inserted by Special Tool.

if the mixture is slightly rich and when the carburetor does not supply sufficient air at high speeds.

A ball check is not necessary; in fact, it would serve no purpose, as there is no back pressure in the intake pipe unless the motor backfires. Ball checks are utilized to control the flow of liquids or air. In other words, the liquid can move only in a predetermined direction.

Decarbonizing Outfit—Information, New York City.

I read in a motoring publication an account of how to construct an oxygen outfit for removing carbon from the cylinders. No doubt your mechanical writer is familiar with the outfit referred to and I would like to be advised if it is practical to make the equipment.

The writer has investigated the equipment referred to, but is of the opinion that it would be more satisfactory to purchase an outfit constructed by a manufacturer who is familiar with the requirements. Decarbonizing outfits are not expensive.

Missing at Low Speeds—Ford, Leland, Ill.

Can you diagnose my trouble with my Ford motor? It skips slightly when it is idling and at low speeds. The valves have just been ground and the clearance between the pushrods and valve stems is right. It isn't the carburetor, as I have tried various adjustments. The valves seat correctly. All wires and connections are good and the engine runs all right at high speeds. I run on the magneto.

The faulty operation of the motor is doubtless due to the plugs. It is possible that one of them leaks; that is, the high-tension current takes some path other than across the gap. It is more likely that the gaps are not correct; that one plug may have too large a gap. If such be the case the spark will be weak at low motor speeds, as the output of the flywheel magneto varies according to the revolutions of the crankshaft.

The writer recalls an instance of missing on a Ford motor which was traced to incorrect spark plug gaps. Set each gap to exactly the same distance, .03125-inch, and use a gauge. Elsewhere in this issue will be found an article dealing with the proper method of adjusting spark plug gaps and testing for ignition troubles.

Briggs Magneto—E. G. W., Boston.

Is the magneto used on Crow Elk-Hart model C motor a high-tension instrument? What is the firing order of the motor? Can you supply me with the wiring plan of the ignition system?

The Briggs magneto is fitted to the motor referred to and is not a true high-tension instrument, as its armature carries but one winding, a primary or coarse wire, and consequently the current produced is low-tension. Like all single-wound magnetos the desired high-tension current is obtained by the use of a transformer or induction coil, which builds up the primary current. The coil has a primary and secondary winding,

is located on the dash, and increases the voltage sufficiently to permit the current to jump the gap at the spark plug.

The wiring plan employed is shown at Fig. 3, and it will be noted that the system is a dual one in that batteries may be utilized for starting or as an auxiliary. When cells are utilized their current is interrupted or broken, and the break timed by the breaker mechanism of the instrument. The low-tension current is then transformed into a high-tension by the coil, then led back to the magneto and distributed to the spark plugs by a distributor. The cable carrying the transformed current will be noted in the centre of the spark plug leads. As the connections of the breaker box are numbered to correspond with those of the coil, it should be a simple matter to rewire the system, if necessary.

The Crow Motor Car Company, Elkhart, Ind.,

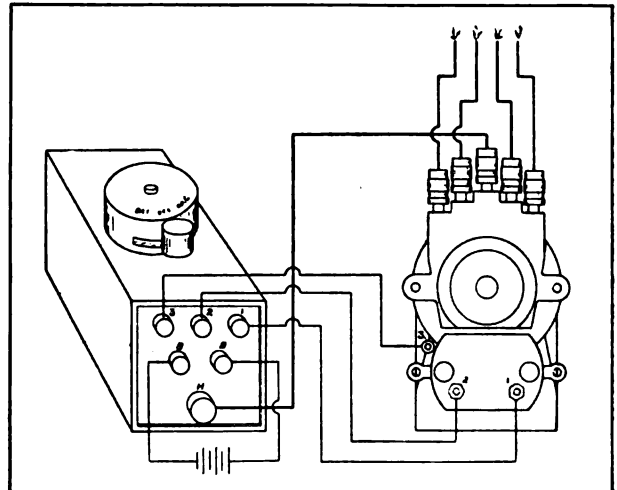


Fig. 3—Wiring Plan of Briggs Magneto Utilized on Four-Cylinder Crow Elk-Hart Cars.

makes several model C motors and their firing orders are as follows: Models C-1-2-3-4-D-T-5, 1-3-4-2; C-8-7-9-P, 1-2-4-3; C-6-1-6, 1-4-2-6-3-5.

Iridium—A. E. T., Brockton, Mass.

I note that some makers of ignition devices state they use iridium points, and others, platinum. What is the difference between these metals and their value in ignition apparatus?

Iridium is not only a rare metal, but its hardness is held to be about equal to that of a ruby. In the cold it is quite brittle, but at a white heat it is somewhat malleable. It is one of the heaviest of metals, having a specific gravity of 22.38. It is extremely infusible and almost absolutely inoxidizable.

Platinum is a whitish steel gray metal, malleable, very ductile, and as unalterable by ordinary agencies as gold. When fused and re-

fined it is as soft as copper. It has a specific gravity of 21.15. It is fusible only by the oxy-hydrogen blowpipe or in strong electric currents. When combined with iridium it forms an alloy of great hardness.

Both platinum and iridium, and in combination, are used for contact points in induction coils, magnetos and electrical devices subject to considerable voltage, to prevent fusing, etc.

Clogged Water Jackets—Constant Reader, Bath, Me.

Can you help me out of my trouble? It has nothing to do with automobiles, but I thought your mechanical man would suggest something, as it has to do with a gasoline engine. I have an old style one-cylinder, two-cycle Lathrop marine engine and the water jackets are badly clogged. The cylinder head plate is removable, but the jackets can't be got at except through a small opening on the side of the cylinder, the inlet and outlet of the water connections. Have tried all kinds of stunts, even acid, but cannot get but a tiny hole through. Any advice will be appreciated.

The engine referred to is one of the early types, with which the writer is familiar. The deposits can be removed, and the best method is to disassemble the engine and take the cylinder proper to some machine shop where a power drill can be utilized.

Remove the top plate and drill .375-inch holes between the studs securing the plates, making sure that the cylinder is held exactly vertical during the drilling. A careful machinist should be able to do this work without any trouble. The drill should be run through the metal and until it strikes the water jacket space.

Next take a long drill or auger and cut the deposits, removing the loose material as the work progresses. By working the drill at an angle, the greater part of the deposits may be removed. By using water under considerable pressure, the jackets may be cleaned sufficiently to provide for a good circulation of water.

The holes in the cylinder head can be plugged up by cutting a standard thread with a tap and fitting bolts, cutting the latter flush with the surface. As a gasket is utilized with the cylinder plate, no trouble should be experienced with leakage of the water. The writer can vouch for this method, having seen the work performed by a marine engine expert, and the motor has been in service over two years since the repair was effected.

Diametrically Opposed—F. E. K., La Crosse, Wis.

As a new subscriber to your magazine would like you to explain what is meant by "diametrically opposed". I note it is used in some of your articles on mechanical subjects.

By diametrically opposed is meant directly opposite. For example: If a line be drawn

through a circle the point where the line is completed would be diametrically opposite that where it began.

PRIZE WINNING ESSAY.

Miss Amy Coon of Scammon, Kan., Will Go to Road Congress in Atlanta.

In a contest in which nearly 5000 school children all over the United States participated, two girls and a boy, all aged 14, have been awarded prizes by Logan Waller Page, director of the office of public roads, for writing the best essays on the repair and maintenance of dirt roads. First prize, a gold medal, went to Miss Amy Coon, Scammon, Kan., a pupil in the Skidmore school; second, to Miss Lucille Huff, Willowdale Farm, Arlington, Ore., and third, Melvin Paulson, Blooming Prairie, Minn. Honorable mention was received by: Robert Barrow, 14, Mansfield Centre, Conn.; George H. Rombough, 11, Woodside, Idaho; Maurine Atkinson, 15, Independence, Mo., and Francis Cochran, 14, Wellman, Ia.

Because of the general excellence of her essay, Miss Coon has been selected by the American Highway Association as the recipient of unusual honors, in addition to her gold medal prize. The organization will pay all her expenses to the annual road congress in Atlanta, Ga., in November, where she will read her essay to the engineers and other delegates attending the congress.

Miss Coon says that the chief reason why earth roads have received no attention and little improvement in the last 40 years is because they have not had sufficient place in the public mind. She adds:

People seldom give the improvement of roads any thought beyond paying their taxes or working them, and sometimes getting out of it altogether. They then find fault with the road overseer. Straight roads are desirable, but in hilly countries it is often necessary to make a winding road in order to have a level grade.

After the road is properly located, the next thing to be thought of is the drainage. A poorly drained road is very undesirable, when, after a rain or snow, the horses' feet and wagon wheels cut it up, it becomes impassable with mud, and then a freeze comes which leaves the road in a worse state than before. When water is allowed to course down the middle of the road it washes out gutters and ruts that are quickly enlarged by the wagon wheels. This can easily be overcome by proper drainage.

Chief McIlhargey of the fire department in Hibbing, Minn., reports that the cost of maintaining and operating the KisselKar combination hose and chemical wagon in service in that city was exactly \$23.16 for the first three months, a saving of more than \$23 a month over horses.

FLAGLER NOW IN LIGHT CAR DIVISION.

ALTHOUGH originally announced from Chicago, the factory of the Flagler Cyclecar Company has been located in Cheboygan, Mich. And it may be added that the design of the product has been changed very materially, eliminating the air-cooled motor, friction transmission and belt drive, and placing the machine in the light car division of the cyclecar class. The body design also has been changed, although it still seats the two passengers side by side. The driver is at the left. The wheelbase is 94 inches and the tread 42.

The new motor is a four-cylinder, four-cycle, water-cooled unit, with bore of 2.75 inches and stroke of four, giving a piston displacement of 95.03 cubic inches. The transmission is a standard gear type, affording two forward speeds and reverse. Drive is by shaft. The service brakes are internal expanding on the rear wheel drums, while the emergency member operates on the transmission reverse.

The frame is of pressed steel channel section, and the body is of sheet metal. This is suspended by semi-elliptic springs in front and full elliptic in the rear. Wheels are of wire, with ball bearing hubs, and carry 28 by 2.75-inch tires. A five-gallon gasoline tank is located under the hood, and the lubrication is by plunger pump.

According to the announcement of W. C. Lumb, general sales manager, the new factory is ready to produce in quantity and the company is in a position to make deliveries. The officers of the concern are: President, Elias S. Flager; vice president, Dr. Arthur M. Gerow; secretary and treasurer, Warde L. Hagadorn.

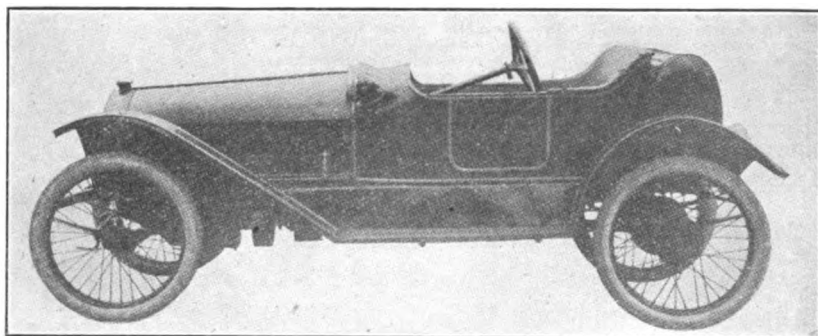
THE LULU SPEEDSTER.

Product of the Kearns Motor Truck Company Is in the Light Car Division.

Several motor truck manufacturers throughout the country have been turning their attention to the cyclecar field, and among the latest to make an announcement of that nature is the Kearns Motor Truck Company, Inc., Beavertown, Penn. This concern has been engaged in

the production of commercial vehicles for some years. It is stated that the new machine, which is termed the Lulu small car, although its piston displacement and weight would place it in the light car division of the cyclecar class, bears the same guarantee against defective workmanship and material as the Kearns trucks.

The Lulu is a roadster type vehicle, with wheelbase of 90 inches and tread of 44. The weight is 850 pounds. The four-cylinder, water-cooled motor is of the L head type, with cylinders cast en bloc, and with bore of 2.75 inches and stroke of four, giving a piston displacement of 95.03 cubic inches. This is mounted as a unit with the selective sliding gear transmission, affording three speeds forward and reverse. The clutch is a leather faced cone. Cooling is by



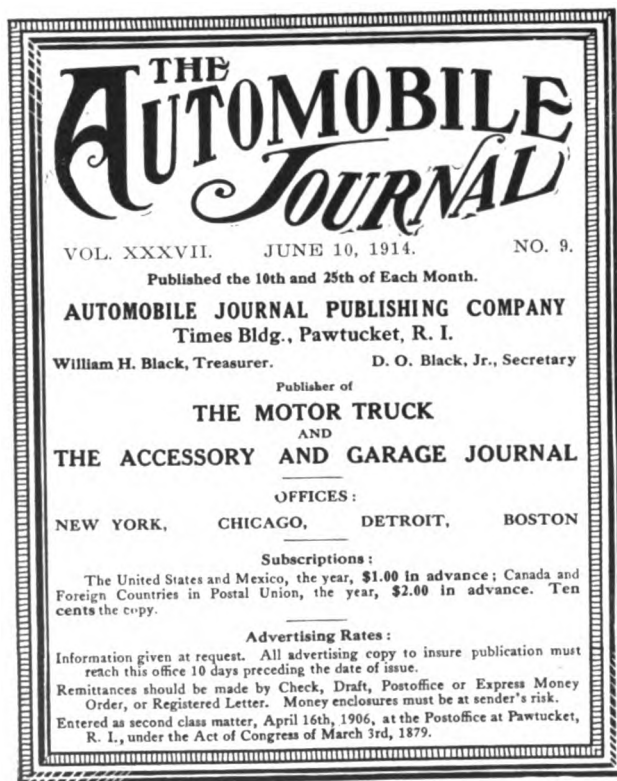
Latest Model of Flagler Cyclecar Is in the Light Car Division.

thermo-syphon and lubrication by constant level splash, maintained by plunger pump. Ignition is by high-tension magneto.

The frame is of steel, channel section, and the body is suspended on semi-elliptic springs, front and rear. Brakes are expanding, on the rear axle, which is of the live type, with a differential in each wheel. The front axle is tubular, and fitted with ball bearings. Wheels are of wire, carrying 28 by three-inch tires.

Seating is with the driver at the left, the control levers being in the centre. The equipment includes a windshield, two gas lamps in front, one oil lamp in the rear, gas tank, bulb horn, etc., while a top and speedometer are listed as extras. The maker also will furnish an electric starter and electric lights on special order.

The race meet of the New Jersey Cyclecar Club, scheduled for Memorial Day, has been postponed to June 13.



EIGHT MILLIONS A YEAR.

Motorists are most interested in highways during the active touring and driving season of the year, and, unfortunately, the interest thus created often is permitted to lapse at the period when legislative authorities are in a position to make appropriations for such work. That automobile owners are warranted in giving careful study to methods and applications of funds is clearly demonstrated by the fact that they are called upon to provide some \$8,000,000 annually, largely for road construction and maintenance.

Much of the preliminary work has been accomplished. Interests which were inclined to look with disfavor upon improved highways in the early days of the industry, are now actively supporting the good roads movement. What is needed at present, is that motorists and others should give greater attention to methods, despite the fact that this is a field properly assigned to the engineer.

There is little disposition to dispute the proposition that politics play an important part in the handling of road funds in America. A body of citizens which contributes \$8,000,000 a year

for this purpose has interests which cannot be overlooked. Engineers may be willing and anxious to provide that which is desired, but public opinion must be aroused to a point where civic need overcomes political expediency.

MASSACHUSETTS' GARAGE LAW.

Organized motorists need the assistance of the manufacturer and the trade in watching legislative action. The responsibility is two-fold, as is clearly demonstrated by the new garage law recently enacted by the Massachusetts legislature. Within the past year, particularly, there has been a very evident tendency toward regulation of the automobile industry, as well as the use of the cars themselves.

"Safety First" is an excellent slogan, and motorists and those connected with the industry may be expected to use every legitimate effort to make this slogan effective. It is often demonstrated, however, that sufficient attempt is not always made to study proposed legislation before it is enacted into statute. This applies to laws affecting other industries than this.

While it may be too early to make definite conclusion as to the working of the new Massachusetts law, it would appear from the first study of its provisions that it could not help but work a hardship upon the automobile business. Already it has caused unlimited criticism, even among those upon whom its enforcement devolves. Had those, whose business this statute presumes to regulate, been invited to co-operate with the legislators in framing the bill, it is probable that many of its objectionable features would have been eliminated without in any way impairing its value in the interests of safety.

SOUTH AMERICAN MARKET.

The importance of the South American field cannot be overlooked by the manufacturers of the industry. The quick response of business men and government officials in Chile and Argentina, to the possibilities demonstrated by the recent successful trans-Andean trip of an American car, may be taken as evidence of the enterprise to be expected of these people. The market would appear to be one that ought to receive careful consideration at the hands of motor truck makers in particular.

REGISTRATION FEES TOTAL \$8,000,000.

What the Motorists of the Several States Paid for Operating Cars in 1913, and How the Money Is Apportioned to Roads, General Fund and Schools.

HOW much money do the motorists of the United States contribute for improved roads? This is a question that has interest for every automobile owner and user, since there has long been a disposition on the part of legislators to increase registration fees upon the slightest provocation—or in the entire absence of justification. And in considering the situation, it is well to keep in mind that horse drawn vehicles are not called upon to bear their proportion of the alleged damage to highways.

In order to secure absolutely reliable data as to the amount of money collected from the motorists in the several states during 1913, The Automobile Journal recently addressed inquiry to the official to whom such payments

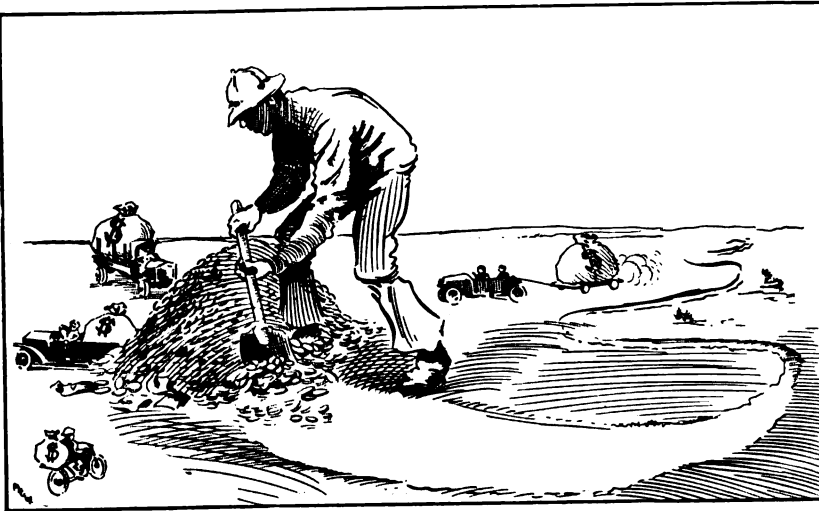
are made in each of the commonwealths, with the exception of Florida, Georgia, Louisiana, Mississippi, South Carolina and Texas. The result of this inquiry is presented herewith in tabulated form, except that it should be stated that in a few instances no returns were received, in which case the best possible estimate has been made, this being based upon reports from state highway officials to the American Highway Association. It is evident, also, that some of the reports from the state officials made direct to The Automobile Journal are estimates, and this can be held to apply generally where round numbers are given.

No returns are presented from Florida, South Carolina and Texas, because registration is by counties. Georgia and Louisiana had no regis-

tration law in 1913, although Georgia has one now, and in Louisiana a bill providing for such registration is pending before the present session of the legislature. Mississippi's registration law was declared unconstitutional by the supreme court. This also applies to Michigan and Ohio, but in these states the new law was not expected to take effect until Jan. 1, 1914.

The tabulation shows that motorists contributed \$8,032,190.02. But not all of this money

was applied to the construction and maintenance of highways—improved or otherwise. In some states automobile fees are turned over to the general fund, and in others they are available for school purposes, while a few divide the money thus collected between high-



A Little Better Than 10 Per Cent. of the 2,235,854 Miles of Road in the United States Is Improved, and Motorists Contributed \$8,032,190.02 for Using These Highways Last Year.

ways and the general fund. A careful computation, on this basis, indicates that 91.2 per cent. of the \$8,000,000, in round numbers, was available for roads; 8.6 per cent. went to the general fund and .2 of one per cent. was utilized for schools.

In order to understand this view of the situation it will prove of interest to study a digest of the motoring laws for the several states, as affecting the distribution of registration fees, which is presented below:

Alabama—Not applied to roads. Forty per cent. of the gross revenue derived from owners residing in incorporated cities and towns is returned to such cities and towns, and 40 per cent. derived from owners in counties, not residing in cities and towns, is returned to the county of their residence.

Arizona—Credited to the state road tax fund.

Arkansas—Equally divided between the state and the county in which the revenue is collected. State portion credited to the state highway improvement fund. County

portion paid into the general school fund.

California—Half of net revenue credited to road fund in county in which it is collected. Half to state treasury for maintenance of state roads.

Colorado—Equally divided between state and county in which it is collected. State portion credited to state road fund to be expended in improving and maintaining state roads. County portion credited to county road fund.

Connecticut—Placed to credit of state highway fund

Illinois—State road fund, expended only in permanent roads.

Indiana—Road fund, apportioned to several counties on Jan. 1 and July 1 of each year.

Iowa—Eighty-five per cent. apportioned to the several counties to be expended only for crowning, draining, dragging, gravelling or macadamizing roads outside of incorporated cities and towns.

Kansas—County treasury, where collected. Maintenance of public roads.

Kentucky—State treasury. State road fund.

Louisiana—No registration. Bill pending.

Maine—State treasury, for repair, maintenance and construction of state highways.

Maryland—One-fifth to Baltimore for use on its roads and streets. Remainder for oiling, repair and maintenance of modern state and county roads.

Massachusetts—State highway commission. Not exceeding 20 per cent. for repairs, improvement and construction of local roads used as through routes.

Michigan—State treasury. Expended under direction of state highway department.

Minnesota—Not applied to roads. General fund.

Mississippi—No registration.

Missouri—State good roads funds. Specific appropriation necessary by legislature.

Montana—State highway fund. Constructing state roads and for apportionment to several counties.

Nebraska—Road funds of county in which collected.

Nevada—Apportioned to several counties for construction of county roads under joint supervision of county commissioners and state engineer.

New Hampshire—Maintenance of highways in accordance with state highway laws. Thirty-five per cent. may be expended in the maintenance of roads in cities, towns and places where roads are not ordinarily maintained with the assistance of the state.

New Jersey—Repairing the more important improved roads.

New Mexico—State highway fund. Expended on public highways, preference being given to automobile routes.

New York—Maintenance and repair of improved roads.

North Carolina—Eighty per cent. to county from which collected, to be expended only on public roads of said county.

North Dakota—Returned to county from which collected for repair and maintenance of main travelled roads of county. No part may be expended within the limits of an incorporated town or city, or within any township that does not levy a road tax of at least six mills on the dollar.

Ohio—One-third for repair, maintenance, protection, policing and patrolling of public roads. Two-thirds to general fund.

Oklahoma—To create a fund for the maintenance of the state highway department.

TABULATED ROAD STATISTICS FOR 1913.

State	Total Mileage	Improved Mileage	No. Cars Registered	Collected in Auto- mobile Fees	Road Ex- penditures in 1913
Alabama	49,639	5,491	6,150	\$85,000.00	\$2,164,000
Arizona	5,987	434	3,583	8,110.50	610,355
Arkansas	36,445	1,045	3,000	25,000.00	1,586,050
California	48,069	8,788	60,000	350,000.00	8,260,611
Colorado	30,421	1,600	15,993	60,883.00	1,917,690
Connecticut	12,583	3,100	26,560	326,796.52	3,100,000
Delaware	3,000	220	2,450	24,735.00	349,000
Florida	17,954	2,175	.	.	1,500,000
Georgia	83,986	22,043	.	.	2,750,000
Idaho	18,403	511	2,344	37,213.00	1,015,000
Illinois	94,141	8,914	106,839	500,000.00	7,100,000
Indiana	63,370	26,831	51,100	143,000.00	8,887,553
Iowa	102,427	2,505	78,389	802,000.00	7,300,000
Kansas	98,302	374	47,500	200,000.00	4,984,000
Kentucky	53,744	10,115	7,210	50,275.00	2,025,000
Louisiana	24,962	330	.	.	2,571,000
Maine	25,528	3,044	10,570	75,000.00	2,296,000
Maryland	17,025	3,431	19,191	222,854.67	3,500,435
Massachusetts	17,272	8,749	71,117	764,153.51	10,617,474
Michigan	68,906	8,698	60,065	190,328.75	4,513,364
Minnesota	79,323	6,206	37,800	25,500.00	5,672,254
Mississippi	44,072	345	.	.	2,000,000
Missouri	107,923	4,758	38,147	173,810.50	4,979,516
Montana	23,319	95	5,686	11,362.00	1,535,271
Nebraska	80,388	249	47,274	94,548.00	2,330,616
Nevada	12,751	62	1,091	3,322.94	150,000
New Hampshire	15,116	1,745	7,436	50,000.00	752,059
New Jersey	14,842	3,613	51,370	350,000.00	4,563,863
New Mexico	16,920	705	1,721	10,000.00	387,194
New York	79,279	17,200	132,257	1,275,727.27	16,938,694
North Carolina	48,285	3,440	10,000	50,000.00	4,704,000
North Dakota	61,593	161	13,988	41,964.00	2,365,000
Ohio	88,861	24,462	86,156	457,537.55	8,088,174
Oklahoma	79,883	499	7,000	7,000.00	4,110,300
Oregon	35,896	4,296	13,957	50,000.00	3,293,008
Pennsylvania	87,387	3,472	131,204	841,062.00	8,064,718
Rhode Island	2,121	1,246	11,379	129,851.00	930,597
South Carolina	45,549	5,888	.	.	1,000,000
South Dakota	56,354	286	15,886	75,000.00	1,250,000
Tennessee	45,913	5,354	4,001	8,002.00	2,000,000
Texas	128,971	4,896	.	.	7,269,592
Utah	8,320	1,653	4,021	8,042.00	597,200
Vermont	14,406	3,078	6,209	111,459.81	1,181,030
Virginia	43,399	3,732	9,022	100,000.00	2,228,590
Washington	39,051	3,950	24,178	48,356.00	5,309,509
West Virginia	32,109	591	5,088	50,000.00	2,268,557
Wisconsin	61,090	11,630	34,646	192,270.00	5,305,000
Wyoming	10,569	416	1,584	7,925.00	507,500
Totals	2,235,854	232,476	1,271,162	\$8,032,190.02	\$177,537,783

*Florida, South Carolina and Texas have county registration and figures are not available. Georgia and Louisiana had no registration law in 1913. Mississippi's registration law was declared unconstitutional by the supreme court.

to be expended in maintenance of state highways.

Delaware—Credited to general fund of the state treasury.

Florida—County registration. Credited to county road and bridge fund.

Georgia—Credited to state road fund, apportioned to several counties in proportion to the number of miles of rural mail routes.

Idaho—State highway fund, expended under the direction of state highway engineer. Seventy per cent. of fees collected from the residents of any county which has issued road bonds shall be returned to such county for the payment of interest on the bonds.

Oregon—Returned to county treasurer for general road fund.

Pennsylvania—State treasury, for assisting in the construction, maintenance and improvement and repair of state highways and state aid highways.

Rhode Island—Repair and maintenance of state roads.

South Carolina—County registration. No provision.

South Dakota—Eighty-seven and one-half per cent. retained by county treasurer, to be used only in grading, crowning, draining, dragging, gravelling and macadamizing public highways of the county.

Tennessee—Perpetual registration. No provision.

Texas—County registration. Perpetual. No provision.

Utah—Credited to state road fund.

Vermont—Repair and maintenance of main thoroughfares and state roads.

Virginia—Special fund. Permanent improvement of main highways of state.

Washington—No special provision.

West Virginia—General fund not roads.

Wisconsin—Three-fourths returned to county where collected, for repairing highways outside of incorporated towns and cities. Remainder to state highway fund.

Wyoming—Four-fifths returned to county where collected. Special fund. Temporary improvement of county roads.

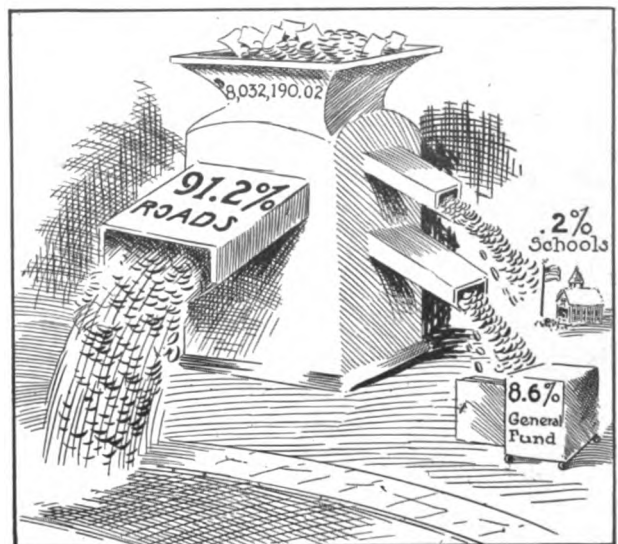
The accompanying table also sets forth the total mileage of roads in each state and the amount of improved highways, according to the latest information available from the United States office of public roads. From this it will be seen that but little more than 10 per cent. of the highways of the country have been improved. Some states are well represented on this list, but others appear to have made little headway in highway improvement, this applying particularly to those of the West and Northwest.

It is somewhat difficult to obtain thoroughly reliable figures as to the amount expended by each state in any given year. The figures presented in the last column of the table are those supplied by the year book of the American Highway Association, and purport to give information as to the amounts expended in 1913, although in some instances these are estimates only. In others the figures are calculated as nearly as possible from an appropriation made to cover two years, as 1912-13 or 1913-14, for example. The fiscal year in some states begins on July 1, or at some other period well removed from the beginning of the calendar year. Thus it will be seen that it is practically impossible to secure an authoritative statement on this point. The figures presented undoubtedly are as nearly correct as it is possible to make them, and probably do not vary materially from the exact total—allowing for discrepancies here and there, either way.

The column devoted to the number of cars registered in the several states is open to the same explanation as was made regarding the amounts collected from motorists. The Automobile Journal has sought to secure the exact figures from those with whom registration is made. In some few instances replies were not received,

and the figures given are the best estimates obtainable.

It would appear, therefore, that there are some 1,250,000 motor vehicles of all classes, passenger cars, commercial vehicles and motorcycles, in use in the United States at present. This figure is by no means exact, since, in the case of Tennessee and some other states, registration is perpetual, and the number of cars credited in the table is that of the machines registered during 1913, on which fees were collected that year. And, of course, there are a large number of machines owned and in use in the states from which no registration figures are given. In computing the total, however, it is necessary to take into account the fact that many registrations are duplications, as, for instance, cars of persons living near the state border, which are registered in two



How the \$8,032,190.02 Contributed by Motorists in Registration Fees Was Distributed.

or more states, etc. It seems entirely probable that the registrations that are missing might be offset—perhaps more than offset—by these duplications, so that the grand total cannot be far from that shown in the accompanying table presented herewith.

While lack of space does not permit of making even a few of the interesting deductions possible by more extended study of the tabulations, those who are mathematically inclined will find plenty of opportunity to exercise their talents. The Automobile Journal offers the table as the most complete that has ever been compiled and as presenting information, in concise form, which should prove of unusual interest to the motorist, whenever his state legislature contemplates raising the registration fee.

EISEMANN MAGNETO ATTACHMENT FOR FORD.

IN KEEPING with its policy not to market a new product until it has been thoroughly tested in practise, the Eisemann Magneto Company, Brooklyn, N. Y., has withheld details of its magneto attachment for the model T Ford motor until recently. In designing the equipment the company gave careful consideration to the

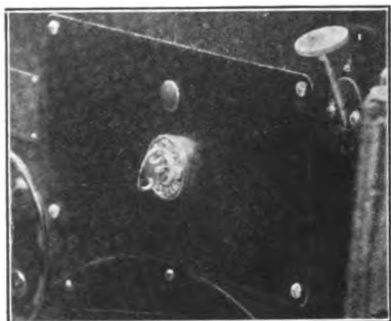


Fig. 1—Switch Used with Eisemann Ignition System for Ford.

method of drive and lubrication, important factors with this high speed motor. Quietness of operation and accessibility, as well as ease of installation, are features.

The simplicity of the equipment will be noted by reference to Fig. 2, and each detail has been worked out very carefully. For example, the trouble generally experienced in removing a gear from a conical shaft without the aid of a special tool, is eliminated in the Eisemann design by a simple device in which the removal of the nut retaining the gear in place automatically pulls off the gear. Another feature, one that will appeal particularly to those not familiar with timing a magneto, is the use of marked gears and an indicating window on the instrument. There is no reason why the most inexperienced should not be able to correctly install the equipment, as the instructions are easily followed.

The attachment is an aluminum casting, it serving a double purpose, in that it provides a bracket for mounting the magneto, also a housing for the driving gears. The structure provides a rigid, well ribbed mounting, and as all bolt and screw holes are accurately machined, it is simply a case of utilizing the parts supplied.

The gear housing, which is integral with the bracket, has two removal covers, these permitting of the fitting of the large camshaft gear and armature gear. The entire construction is proof against leakage of lubricant, special gaskets being utilized.

For driving the magneto, two bronze gears are employed. The larger one is securely fastened to the camshaft by means of a spacing ring,

dowel pin, lock washer and a nut. The dowel pin is extra heavy and, passing through the gear directly into the shaft, assures a positive and reliable drive. The magneto pinion is retained by a Woodruff key, lock washer and nut, and the magneto is secured to the bracket by dowel pins and straps. Control of the movement of the breaker box of the magneto, providing variable ignition, is by means of a shaft passing through a solid bearing in the support, and a lever and link. This linkage is connected to the Ford ball joint at the base of the steering column by a second lever and rod. The movement provided is sufficient to permit the timing lever of the magneto to be advanced to its maximum without the spark lever travelling over the entire length of the quadrant.

Reference has been made to the easy timing feature. The Ford crankshaft and camshaft gears are marked and, with these marks registering, the camshaft gear is removed and replaced by the marked new gear. With the magneto on its base, its armature is turned until the figure 1 appears in the indicating window. The magneto pinion is then slid on and so meshed with the camshaft gear that the marks coincide. As the new camshaft gear is retained by a dowel, it is a simple matter to install it correctly.

Careful attention has been paid to supporting

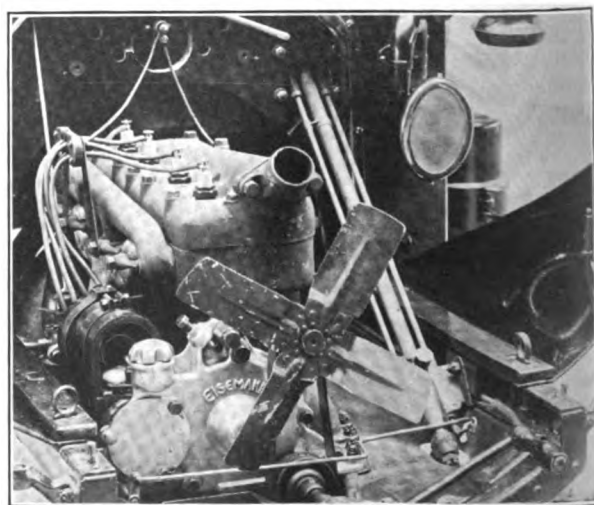


Fig. 2—Showing the Eisemann Magneto Attachment for Ford Motors Installed—A Quiet Gear Drive, Well Lubricated, Is Among Its Practical Features.

the high-tension wires leading from the distributor of the magneto to the spark plugs, a solid bracket being utilized. It is secured to the two

middle bolts of the stirrup holding the intake and exhaust manifolds.

As the Eisemann system eliminates the coil, the space on the dash is neatly covered by an enamelled steel plate, as indicated at Fig. 1. This plate carries the Eisemann switch, a simple and efficient construction, one permitting of securely locking the car, as its key is removable. Moving the key to the side of the switch marked "M" permits the high-tension current of the magneto to pass to the plugs. To cut off the current supply, the key is pushed in and moved to the "Off" position. As with all true high-tension magnetos, the motor is stopped by grounding the primary current, and with the Eisemann Ford installation a wire is carried from the breaker box to the switch, thence to a cylinder head bolt, the arrangement being clearly depicted at Fig. 2. The simplicity of the wiring plan is obvious.

The magneto supplied is the well known EM type, a true high-tension magneto, which provides a very hot spark at very low motor speeds, and it is stated that the Ford motor car be started easily on a quarter turn. For those owners desiring to start the motor on the spark, the Eisemann Magneto Company supplies the dual ignition system, type EB. This includes a flush type dash coil, having a starting button, which, when pressed, produces a shower of sparks in the cylinder on compression. This system lists for \$5 extra.

The advantages of a true high-tension magneto over the usual Ford ignition system are many, and were described in the issue of *The Automobile Journal* for May 25, 1913. The writer accompanied the owner of the car referred to in that article, in its trials, and ease of starting, quick response to the throttle, increase of power and a cool motor were among the noticeable features. The increase of speed was over 20 per cent.

The Eisemann Magneto Company is issuing a neat booklet, which describes and illustrates in detail the magneto attachment for Ford motors.

INSPECT WHITE FACTORY.

Seventeen Selling Agents in New England Visit the Plant in Cleveland, O.

Seventeen selling agents for the White line of passenger cars and trucks, made by the White Company, Cleveland, O., visited the factory last month as guests of J. S. Hathaway, manager of the New England branch in Boston. At the

plant full opportunity was given to study the details of manufacture, the men being under the special charge of Walter C. White, vice president and general manager. Those in the party were:

C. A. Gilmore, H. M. Gordon and William T. Barry, Boston; H. A. Peck, Taunton, Mass.; W. A. Speare, Manchester, N. H.; H. I. Cashman, Worcester, Mass.; Ernest Place, Fall River, Mass.; H. F. Vesper, Rockland, Me.; R. S. Bridge, Pittsfield, Mass.; J. S. Coy and R. W. Tanner, New Bedford, Mass.; E. C. Hall, Brockton, Mass.; J. W. Norcross, Marshall Scott and H. W. Hooker, Springfield, Mass.; A. C. White, Jr., Bridgewater, Mass., and E. A. Sontag, Providence, R. I.

COL. POPE AGAIN HONORED.

Well Known Automobile Man Heads National Association of Manufacturers.

The importance of the automobile industry again received encouraging recognition at the annual meeting of the National Association of Manufacturers held in New York City, May 21, when Col. George Pope of Hartford, now receiver for the Pope Manufacturing Company of that city, was re-elected as president. The other officers are: Treasurer, A. B. See; secretary, George S. Boudinot; general manager, J. Philip Bird, all being re-elected.

It will be understood that this organization has no connection with the automobile industry, as such, being a national body of manufacturers producing all lines of goods. Col. Pope has been prominently identified with the manufacture of motor cars for many years, and has held numerous offices in the organizations of this industry. He was selected to head the National Association of Manufacturers last year, and his re-election at this time is worthy of special mention.

G. H. Townsend, 2nd., president, and H. H. Boyce, secretary, of the Motometer Company, New York City, attended the Indianapolis race in the interests of their product.



Col. George Pope, Re-Elected President of the National Association of Manufacturers.

PROTECTING TRUCK COOLING SYSTEM.

THE system for cooling the motor of a power wagon is usually much larger than for a passenger car, because of the slow speed of operation and the lessened circulation of air. The possibility of damage is materially increased and designers have directed much attention to the protection of radiators. Two examples of tubular construction of recent design may be noted in the sketches of the Chase and GMC machines shown herewith.

The radiators used for the two and three-ton, water-cooled Chase models are of the vertical round finned tube construction, with the header in a casting with wide fins. In this the tubes are soldered. One or a number of the tubes could be damaged, and with these removed the tank could be plugged and the machine used. Repairing is a simple matter of soldering. These radiators are supported by lugs installed between helical springs in a housing bolted to the chassis frames, and are not affected by chassis distortion.

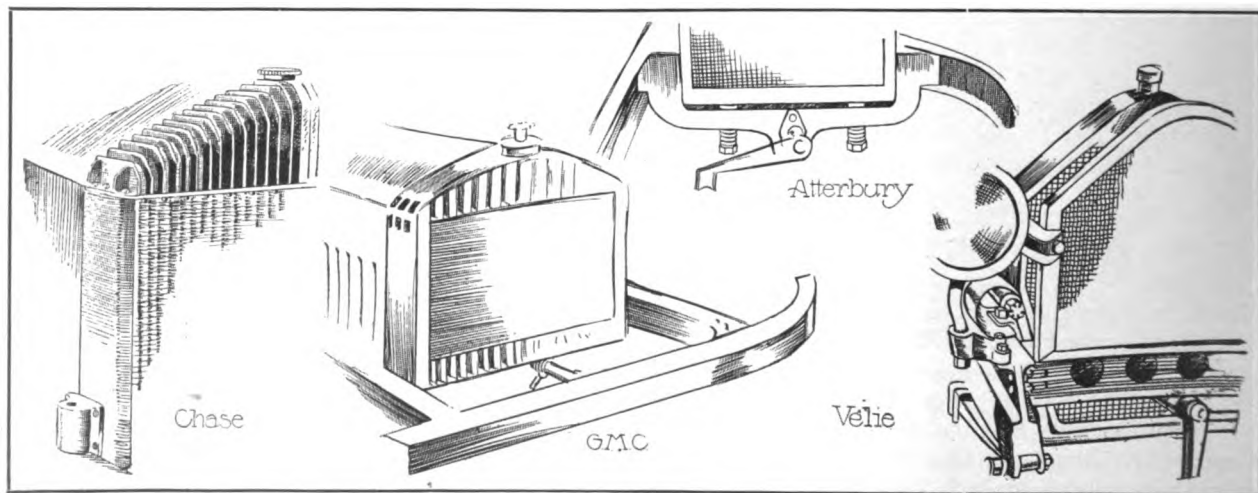
The GMC radiator is a different form, but the principle is much the same, the header, base and side columns being one assembly, and into this frame is set a flat tube centre section with the tubing horizontal. The frame can be taken apart, the castings being bolted together, for cleaning, and a spare centre section can be installed with comparative ease. The radiator is installed within the frame, and the side frame members are extended forward, while the front cross member is the full width of the truck body, so that the radiator is unusually well protected. This construction is employed on both the 2500

and 4000-pound machines, made by this concern.

The Atterbury chassis are fitted with honeycomb radiators that have very rigidly constructed frames, and these are mounted on two sets of helical springs that are carried on the frame front cross member. Two heavy bronze bushings are fitted in the frame member, and in these are sockets into which helical springs are seated. From the bottom of the radiator base two bolts project vertically, and these are carried through the springs and holes in the bushings. Below the frame two shorter springs are seated against the web, clamped by collars secured by nuts on the bolt ends.

The radiators of the Velie three-ton trucks are a honeycomb type, and are installed in a frame in which they are supported on springs, this minimizing any influence from chassis distortion, but protection is afforded by the curved front cross member of the frame, which is carried on extensions of the side members. As an additional protection a heavy wire screen is mounted in the frame, of the same form as the radiator, and this frame is supported by bolts through a base flange and by a heavy bracket extending from each of the lamp brackets. The screen insures abundant circulation of air and prevents anything contacting with the radiator.

F. W. A. Vesper, assistant general sales manager of the Buick Motor Company, Flint, Mich., has purchased the company's branch house property and business at St. Louis, which he will operate as the Vesper-Buick Company.



Some Examples of Radiator Construction: Sectional Vertical Tube Model on Chase, New Type Installation on GMC, Spring Supported Design on Atterbury and Screen Protector on Velie.

DUMPING BODY FOR HANDLING ASPHALT.

ONE of the problems which contractors for street construction are called upon to face is that of having asphalt intended for application on a paving job at the right condition when it is delivered for work. Asphalt as a material may be received in drums or barrels, or other containers, but when applied it must be mixed with sand and gravel to give it sufficient body, so that it will not soften and be cut by the wheels of traffic. This means that it must be prepared by heating and mixing, and this can only be done where the facilities are adequate for the purpose. Thus, with rare exceptions, conditions do not warrant the establishment of a temporary plant.

If permitted to cool, the mixture cannot be worked, and when solidified, it must be broken and heated, necessitating expensive work. It can only be applied to dry surfaces, and usually it is spread by rakes and then rolled to a uniform thickness. Generally the contractor prepares the mixture at a permanent plant and depends upon some method of carrying it heated to the job. If the haul is long there is probability of cooling, and in any event it is difficult to handle because of adhesion to the vehicle in which it is transported.

Handling asphalt by motor trucks requires a body that can be elevated to such a degree that the load can be dumped by gravity. Quick handling is the solution of the work. To meet these requirements, the Brooklyn Alcatraz Asphalt Company, Brooklyn, N. Y., recently purchased nine five-ton White trucks, made by the White Company, Cleveland, O., these being fitted with steel bodies and power hoists by which the highest elevation can be reached in 30 seconds.

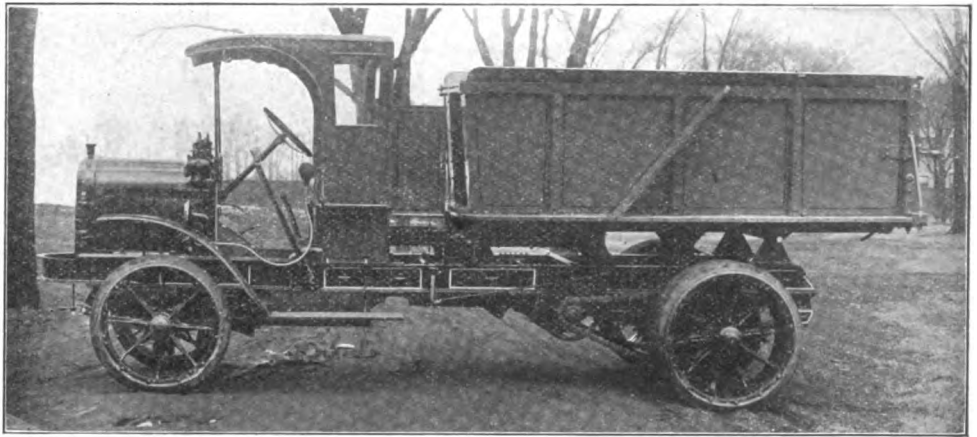
This is held to be the largest number of motor trucks operated by a concern handling asphalt anywhere in America and possibly in the world. The machines have been in service in New York City for some little time, and are giving the high-

est degree of satisfaction in every respect. It may be added that a number of other similar trucks made by this concern have been sold for such work in the Middle West during the past few months.

PEERLESS FOR ARMY WORK.

Machine Recently Shipped to Texas Replaces Mules in Field Service.

S. M. Williams, southern sales representative of the Peerless Motor Car Company, Cleveland, O., reports that the Peerless truck recently shipped from the factory to Beeville, Tex., has entered the service of the United States army.



White Five-Ton Truck Chassis Fitted with Special Power Dumping Body, One of a Fleet of Nine Purchased by the Brooklyn, N. Y., Alcatraz Asphalt Company.

Its first work was that of proceeding to Houston, 250 miles from Beeville, there to assist in the movement of the troops to Texas City.

The machine left Beeville Tuesday morning, running over roads, a large portion of which had previously been regarded as impassable for motor trucks because of mud, sand and general adverse conditions. After 35 hours of continuous running, except for stops to take on gasoline and permit the crew to eat, the machine arrived in Houston Wednesday afternoon.

On the journey from Houston to Texas City the load consisted of army supplies, and in addition, the truck hauled a loaded trailer. Much the same road conditions prevailed, but in spite of these the journey was accomplished without difficulty and the truck was thereupon accepted by the government.

OIL PRODUCTION AND GASOLINE PRICES.

WITHIN the past six months, in addition to the reduction in pipe line dividends, several other companies in the Standard Oil group have reduced, and in some cases omitted, their extra dividends. Last month the New York Transit Company declared an \$8 dividend in place of the \$10 dividend which has been declared regularly every three months since the beginning of 1912. This situation, taken in connection with the price of crude oil at the wells, which has dropped materially during the last six weeks, is of interest to the automobile industry, as having a bearing on the price of gasoline and other refinery products. So far as can be learned, the present price of gasoline in tank wagon lots is pretty general at 15 cents, although so-called 60 test gasoline has been sold recently in some portions of the Middle West at 12.5 cents.

Illinois, West Virginia, Pennsylvania, Kentucky, Indiana, Ohio and New York, was 50,200,000, a decrease of almost 10,000,000 barrels.

The United States is at present producing almost two-thirds of the world's oil output, while Russia is second with 18 per cent. California produced nearly 25 per cent. of the world's output for 1913. Russia's maximum was reached in 1910, with 70,336,574 barrels. Much interest is now centred in the exploitation of South American fields, particular attention being directed toward the development of this territory in contemplation of the opening of the Panama canal. Thus far Peru is the only large oil producing country, although considerable development work was done in Venezuela last year.

Since the beginning of the year great interest has centred in the Mid-Continent field in the

United States, and it may be stated that the first break in the present fall of prices occurred in Kansas-Oklahoma. The Oil City Derrick is authority for the statement that the Cushing district is now the largest high grade oil producing field in the world. A recent dispatch from Tulsa, Okla., states that Cushing is now producing at the rate of 98,000 barrels a day from 78 wells.

Six months ago, it is stated,

this district was considered a dead one. The discovery of the prolific Bartlesville sand created unusual excitement, and it is added that this district is 10 miles in length by five wide and embraces practically 30,000 acres of land. Wells now being drilled are expected to increase the present production by 40,000 or 50,000 barrels a day. This should make the annual production something like 50,000,000 barrels. But it is maintained that the district has only been "pin pricked", as it were.

Thus far, the situation does not appear to have affected the price of gasoline very materially. The reason given for the reduction of dividends in the Standard Oil groups is the diminished consumption of petroleum.

Nelson B. Hazeltine, formerly Philadelphia sales manager for the Adams-Bagnall Electric Company, has joined the sales organization of the Electric Storage Battery Company at 100 Broadway, New York City.

TABLE OF WORLD'S OIL PRODUCTION.

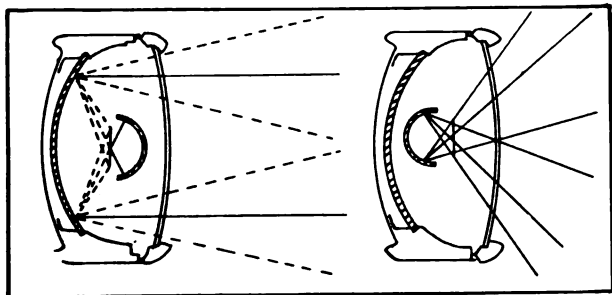
Country	1913	1912	1911	1908
United States	242,000,000	222,113,218	220,440,291	178,527,355
Russia	66,500,000	68,019,208	66,183,691	62,186,447
Mexico	26,000,000	16,558,215	14,051,643	3,481,410
Roumania	13,500,000	12,991,913	11,107,450	8,252,157
Dutch East Indies	11,000,000	10,845,624	12,172,949	10,283,357
Galleia	7,800,000	8,535,174	10,519,270	12,612,295
India	7,200,000	7,116,672	6,451,203	5,047,038
Japan	1,800,000	1,671,405	1,658,803	2,070,145
Others	2,500,000	2,331,043	1,934,079	1,620,133
Totals	378,300,000	351,178,236	345,512,185	285,089,615

Stimulated by higher prices, due to a heavily increased demand, the world's production of petroleum attained a new high record in 1913. Taking what are generally considered the most reliable estimates for foreign countries, together with the preliminary figures for the United States, the total output of the world last year was something like 378,000,000 barrels of 42 gallons each, as compared with the Geological Survey's figures of 351,178,236 barrels as the actual production in 1912. In seven years there has been an increase of over 80 per cent. The accompanying table gives the estimated production for 1913, compared with the actual figures for the other years listed.

According to the Wall Street Journal, California supplied most of the increase in the United States, its output for 1913 being approximately 98,000,000 barrels. The Mid-Continent field (Kansas-Oklahoma) was second in increase, with 64,500,000. The production in the Appalachian and Lima-Indiana fields, which include Il-

ZEISS HEADLIGHTS ELIMINATE GLARE.

THE problem of eliminating the glare of motor car headlights is being given consideration abroad and an ingenious method of accom-



Two Diagrams Showing the Effect of the Zeiss Auxiliary Reflector in Its Two Alternative Positions.

plishing this end is noted in the Zeiss headlights, made by Carl Zeiss, Ltd., London, England, a well known English lamp maker. The anti-dazzling feature is incorporated in both acetylene and electric units.

Two reflectors are utilized in the acetylene unit, the main being a spheroid glass mirror silvered on the reverse side and having a very large aperture. The second or auxiliary reflector is also a spherical glass mirror silvered at its back, but it is so arranged as to form in the plane of the flame and in front of it, an inverted image of similar size. Although a small portion of the light emanating from the main reflector is intercepted by the auxiliary member, it is stated that it is a negative factor, as the auxiliary acts as an intensifier.

The auxiliary reflector is so arranged that it can be turned round, it being actuated by a Bowden cable. When its position is reversed it cuts out the back rays of the main reflector, providing a wide diffusing and non-glaring beam.

The electric lamps are similar in design, except that in place of the burner a partially silvered bulb is utilized, this silvered portion acting as the auxiliary reflector. Around the inside of the rim of the lamp is a white reflecting shade, which is employed to obtain a uniform illumination directly in front of the car.

The front glass employed differs from that used with the acetylene unit in that it is fluted, it providing an additional side light at an angle of about 45 degrees for negotiating curves. The revolving bulb holder is actuated by the Bowden cable referred to, enabling the driver to cut out the dazzling rays as desired.

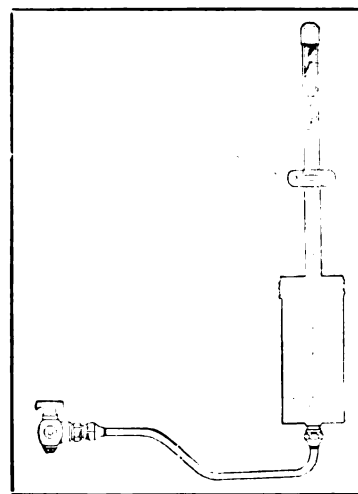
It is stated that the electric unit provides a very clear light, and that the rays are free from the rings, also that the use of the auxiliary reflector referred to, enables pedestrians and other users of the highway to approach the car without being blinded, as all upward rays are eliminated.

CLEANING THE MOTOR.

Motors that have seen considerable service are apt to be more or less covered with lubricant as the oil works out between the pushrods and their guides. The lubricant attracts more or less road dust, which is a rapid cutting abrasive. It is an excellent plan to go over the power plant and remove all traces of oil, as this will not only prevent undue wear of the exposed working parts, but will save the clothing when an adjustment must be made on the road.

CULMER OIL GAUGE.

The Culmer Engineering Company, 6 Church street, New York City, is marketing an oil gauge for the model T Ford motor, which enables the driver to note the supply on hand without leaving the seat. It is of the dashboard type and the amount of lubricant is indicated by a moving member in an indicating tube, this being graduated to make for easy reading. The gauge is constructed of heavy brass and the glass indicator tube is of extra heavy stock. The gauge proper is provided with a large float and it is stated that it will not stick or bind, and that the device will register accurately. The accompanying illustration shows complete construction, also connection between the gauge and the crankcase of the motor. The equipment is moderately priced.

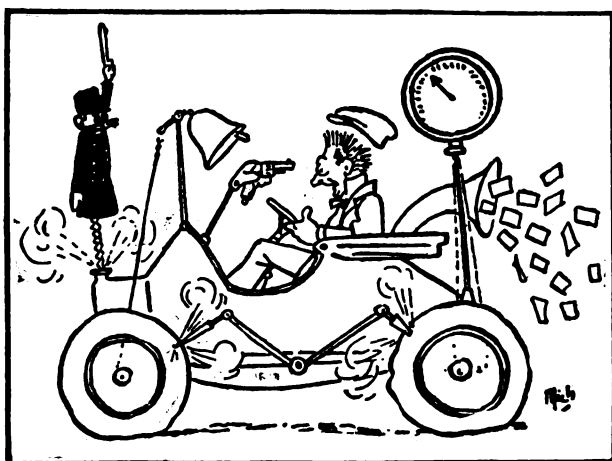


Culmer Ford Oil Gauge.

MODERN LEGISLATIVE TENDENCIES.

IN VIEW of the fact that some 160 bills affecting motorists and motoring were introduced in the legislatures of the 10 states which held sessions this year, it may be contended that there is little occasion for suggesting anything new along this line. In the light of past experience, it would seem that the first thing a legislator-elect considers is the possibility of introducing some new bill regulating the use of automobiles.

That a larger percentage of these measures are not enacted into law is due to the activity of organized motorists, and during recent years these have been assisted very materially by organizations of manufacturers and dealers. There are many subjects upon which legislation is proposed, and often there is room for genuine differ-



Cartoon Reproduced from L'Auto of Paris, France, Showing Artist's Conception of Legislative Tendency.

ence of opinion, but the field has offered, and continues to offer, unlimited opportunity for the practical joker.

Herewith is presented a cartoon reproduced from L'Auto of Paris, which might well have been suggested as a result of reading over a list of the 160 bills mentioned above. The artist has depicted a motorist self-convicted of exceeding the speed limit, his machine being plentifully supplied with automatic devices. Besides being threatened with a revolver, warned by a gendarme mascot and notified by a clanging bell, his tires are punctured, his name and address are being circulated by means of identifying cards and a huge speed indicator shows the actual speed he has attained. That this is not much overdrawn is evident, when it is remembered that one of the New Jersey solons introduced a

bill providing for the automatic distribution of 72 metal tags bearing the license number of the machine under somewhat similar conditions.

ONE RIDDLE IS SOLVED.

Massachusetts Legislature Tells When a Motorcycle Is an Automobile.

Under the title, "An Act Relative to the Operation of Motorcycles", the Massachusetts legislature has successfully solved a riddle which has been worrying the state highway commission and motorcyclists in that commonwealth ever since the sidecar became popular. For the benefit of those who may desire to know when a motorcycle becomes an automobile, attention may be directed to the reading of the new statute:

Section 1—Motorcycles shall, on and after the first day of January, in the year 1915, carry two number plates, displayed and illuminated substantially in the same manner in which other motor vehicles are required by law to display and illuminate them. The number plates shall be furnished by the Massachusetts highway commission, and shall be of such size, shape and color, with such letters and figures thereon, as said commission may from time to time determine. No seal shall thereafter be furnished or used.

Section 2—A motorcycle with a sidecar attachment may be operated provided that the owner has registered it as an automobile, pays the necessary fee for such registration, and displays the number plates above provided for in the manner hereinbefore set forth.

Section 3—The owner of any motorcycle, already registered as a motorcycle, who has paid the necessary fee, may, upon proper application, have it registered as an automobile by paying the additional fee necessary to make up the total sum of money required for the registration of an automobile of like horsepower, and may thereafter operate it either with or without the sidecar attachment, using the same plates.

Section 4—All acts and parts of acts inconsistent herewith are hereby repealed.

Section 5—This act shall take effect on the first day of January, in the year 1915.

NEWS NOTES FROM ABROAD.

Consul-General Ernest L. Harris of Stockholm, Sweden, reports that there is a wide market for American automobile tires in that country, providing the manufacturer is willing to make the exact size required by the Swedish buyer, which is usually 32 by 4.5 inches. The bulk of the business is now going to England and Germany. The makers of the latter country, in particular, are willing to get their money in Stockholm and give three months' credit. There is but one tire factory in Sweden, and this is quite unable to supply the home demand.

Three American makes of cars were on display at the 11th annual international exhibition of automobiles and automobile accessories held recently at Prague, Bohemia, these being the Studebaker, Ford and Hupmobile. Display space cost about \$25 for each car for the week, and about 200 machines were shown.

NOVEL THERMO-ELECTRIC INDICATOR.

A DEVICE for notifying the operator of a gasoline vehicle when the supply of cooling fluid requires replenishing and indicating an

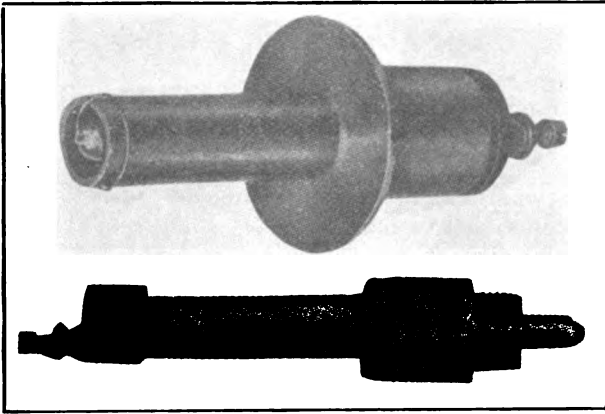


Fig. 1—Thermo-Electric Indicator for Notifying Driver of Abnormal Rise of Temperature of Water (Upper View) and When Radiator Needs Replenishing (Lower View).

abnormal rise in its temperature has been brought out by an English engineer. It differs from those marketed in this country in that electricity is utilized to light a dash lamp, the circuit being closed by the expansion of mercury. The device is manufactured in two styles, which, although very similar in construction, perform two different functions. One indicates to the driver when the temperature of the cooling water has risen to an abnormal degree, while the other informs him when the radiator requires water.

A sectional drawing of the thermo-electric indicator, as it is called, is shown at Fig. 2, and in this instance it is indicated applied to a radiator. The fitting consists of a brass body A having a screw flange by which it is attached to the radiator tank, and a brass tube B which projects into the water space. This tube supports a thermometer C, into the bulb of which is fused a platinum wire, making contact with the brass tube C. A platinum wire is also fused into the other end of the thermometer tube, and is connected to a terminal D carried in a vulcanite packing E. A rubber washer G, compressed by means of a washer and nut H, prevents leakage. The electrical circuit includes a battery K, switch L and small red lamp M, the last named fitted to the dash.

When the radiator is full or the level of the water is above the instrument, the temperature

is not sufficient to cause the mercury in the bulb of the thermometer to expand enough to make contact with the platinum at the other end of the tube, but as soon as the fluid falls below the tube B, the temperature of the steam generated causes the mercury to expand sufficiently to complete the circuit, and the dash bulb is lighted.

The other instrument is similar, except that instead of being provided with a flange it is intended to be screwed into any convenient point in the cylinder cooling system. When thus used a lower temperature completes the circuit than in the radiator device. In installing it the normal temperature of the water is first ascertained, and a thermometer utilized which will complete the circuit when a rise of 10 per cent. is experienced. If both instruments are used, different colored lamps are employed, or one can be substituted by a buzzer, which would be more effective in attracting the attention of the driver.

An interesting comparative test demonstrating the hill climbing ability of a duplex drive, model 48 Detroit electric, made by the Anderson Electric Car Company, Detroit, and equipped with Edison batteries, took place recently at Orange, N. J. The machine carried five passengers up Eagle Rock hill, having a grade of 25 per cent. and being one mile long, while the competing car, of another make, carrying two passen-

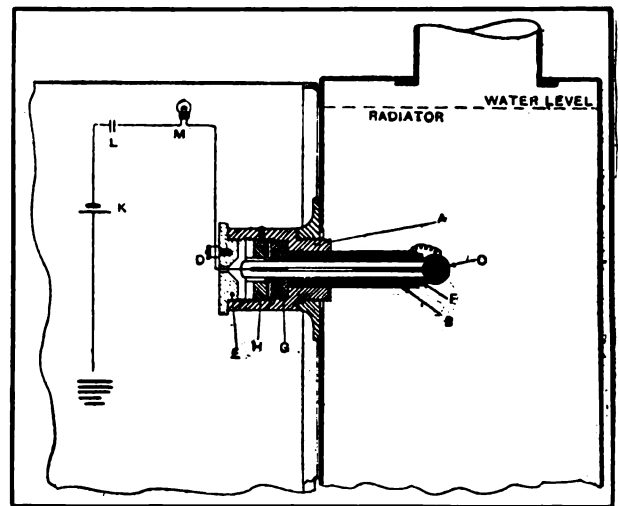


Fig. 2—Sectional View of Thermo-Electric Indicator Installed on Radiator.

gers, failed about half way up the hill. The Detroit made the hill at a speed of eight miles an hour, and without difficulty.

BOTTLER'S DOUBLE-DECKED WAGON.

IN ORDER that the motor truck owner may secure the widest measure of service from his vehicle, it often becomes necessary to provide a special body installation. Manufacturers of commercial vehicles realize the importance of such equipment, and, so far as is practicable, endeavor to produce that which will meet the needs of the purchaser. An example of special body design is shown herewith, this being the work of the Palmer-Moore Company, Syracuse, N. Y., maker of Palmer-Moore delivery wagons.

The machine was purchased by the Zenith City Bottling Works, Duluth, Minn., and is rated at 1600 pounds capacity. The use to which it is being put is that of delivering bottles carried in

can be carried so placed that changing is unnecessary. In the event of storm the body and load may be covered by a tarpaulin, which gives every protection needed.

OPEN ARMY TRUCK BIDS.

Manufacturers of the Industry Ready to Make Early Delivery to Government.

It was demonstrated by the bids opened by the depot quartermaster in Washington, D. C., May 25, that the manufacturers of the industry are prepared to supply the War Department with motor trucks on comparatively short notice.

Seventeen chassis are desired by the government, and bids also were opened at El Paso, Tex.; Fort Sam Houston, Tex.; Chicago and St. Louis. The Washington bids were as follows:

Thomas B. Jeffery Company, Kenosha, Wis.; \$2300 each, delivered in 40 days in Kenosha.

Velle Motor Vehicle Company, Moline, Ill.; \$2022, delivered in Moline; \$2074, delivered in New York City; \$2112, El Paso; all deliveries within 44 days.

Federal Sales & Service Company,

Washington, D. C.; \$2200, delivered in 60 days at Detroit.

Bessemer Motor Truck Company, Grove City, Penn.; \$2265, delivered in New York City; \$2290, delivered at El Paso; deliveries in 90 days.

Driggs-Seabury Ordnance Corporation, Sharon, Penn.; \$2440, delivery at Washington or New York City; four within three weeks and four a week thereafter.

Lord Baltimore Truck Company, Washington, D. C.; \$2500, delivered in 90 days at Washington.

Kelly-Springfield Motor Truck Company, Springfield, O.; \$2400, delivery at Springfield; four in seven days, eight in 14 days, five in 21 days.



Double-Decked Platform Fitted to a Palmer-Moore Delivery Wagon for the Service of the Zenith City Bottling Works, Duluth, Minn.

crates or racks. It might be contended that these could be stacked, but the experience of the company indicated that this was not desirable for several reasons, and particularly because of the loss of time in continually handling the racks.

The body consists of two decks, each 90 inches long and 66 wide, with a slight rail at the sides and ends to prevent the load shifting from movement of the machine. The upper deck is two feet above the lower, and is supported by four corner and two side stanchions, tied by bolted angle straps, the construction being light, but very strong. The two decks have a total area of 82.5 square feet.

With this form of body the crates can be handled from either side and the rear, or from the front or the running boards. The full freight

A. O. Dunk, president of the Puritan Machine Company, Detroit, has purchased the assets of the Reliable Dayton Auto Company of Chicago, from S. Winternitz & Co. The purchase includes all patterns, tools, service parts and other property formerly used in manufacture of trucks. The entire stock has been removed to the Puritan Machine Company's warehouse.

INTERESTING CONSTRUCTIONAL DETAILS.

ONE of the claims made for the use of the Daimler flexible coupling, which has been adopted by several motor truck makers in this country, is that this has a sufficient universal action at all times to meet practically any condition. It is also maintained that it is light; that the wear is almost negligible, and that replacement can be made at comparatively small expense.

The Daimler coupling consists of two spiders having three arms, the centres being 120 degrees apart. Each of these is bolted to a series of three or more rings of specially prepared leather, so that the bolt centres are each 60 degrees apart. With small sizes, round washers are used on either side of the leather rings, but with the large sizes keystone washers are employed, these better distributing the strain upon the leather.

Most makers use these couplings between the gearset and the differential, either one or two as may be believed necessary. In the Stewart 1500-pound wagon they are utilized between the clutch and gearset, the accompanying illustration indicating the manner of installation.

Among the special fittings brought to the attention of the public recently, is the engine operated winch shown herewith. The machine in question was designed for the transportation of laundry machinery of considerable weight, such as would need the services of an extra crew of men to handle.

The winch is simple, consisting of a cross shaft with a drum at either end, outside of the driver's seat. This shaft is connected with the transmission gearset and so coupled that it can be operated in either direction, control being by two pedals.

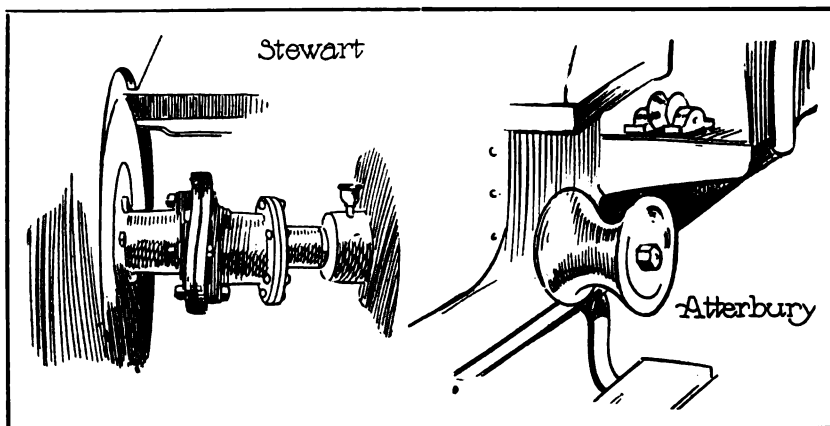
Two skids are carried in recesses in the deck of the body, these being arranged to be drawn out and placed at any convenient angle. The machinery is drawn into and lowered from the body on the skid, and with rope attached to it the freight can be handled quickly and without difficulty by the power of the engine, the rope being carried over sheaves directly back of each drum.

Aside from the pedals, the sheaves and the drums, no evidences of the equipment appear. From four to six men would be necessary to handle the freight usually carried by this truck.

ADDS SPECIAL LINE.

Cadillac Motor Car Company Producing Several New Body Installations.

Announcement is made by the Cadillac Motor Car Company, Detroit, that it is placing in the market a chassis of 134 inches wheelbase, to which several new body installations will be fitted. These include patrol wagons, ambulances, undertaker's wagons, fire apparatus and hotel



Daimler Flexible Leather Coupling Between Clutch and Gearset on Stewart Machine, and Engine Operated Winch on Special Atterbury Chassis.

and livery 'buses and others of similar character.

The 'bus may be had with capacity for 10 persons, and the body may be either open or closed. The undertaker's wagon may be used as a combination hearse and casket wagon. And, in addition to the vehicles listed above, it is possible to secure light delivery wagons with screen sides or with enclosed bodies for small package delivery, etc.

William Besserlich, designer of the Four Wheel Drive truck and one of the founders of the Four Wheel Drive Auto Company, Clintonville, Wis., has disposed of his interest in that concern, and it is understood that he is negotiating with Pacific Coast capital for the establishment of another company somewhere in the State of California.

HINTS ON CARRYING SMALL PARTS.

MANY motorists, especially those owning cars which have seen considerable service, make it a practise to carry an assortment of bolts, nuts, cotter pins, etc. The methodical automobilist places these in separate containers, but some jumble the supplies indiscriminately in the tool box.

Even when carried in small boxes there is opportunity for the covers to work loose, spilling the material. A handy container for nuts, bolts, etc., is to take a screw cap box, such as is utilized to mail bottles and cans containing liquids. These can be obtained easily and by using the small sizes the different articles can be compactly carried. Generally the containers are lined with cardboard or similar material, preventing rattling.

A very handy spark plug carrier can be manufactured with the screw cap boxes. Select a box large enough to carry three or four plugs and divide it into compartments, arranging these so that the plugs will fit snugly. Patches and cement, and a number of other supplies can be stored in these containers and by equipping them with labels the desired material is quickly located.

CLEANING RADIATORS.

The Northwestern Chemical Company, Marietta, O., maker of Se-Ment-Ol, Carbonox, etc., makes the following suggestion for cleaning radiators:

Whenever soda is used to clean out a radiator in which calcium chloride has been used as an anti-freezing solution, the soda reacts with the chloride, forming sodium chloride or common table salt. This new formation is liable to harden and create trouble. Therefore, when using the soda solution it should be employed hot.

A practical and efficient method of cleaning a radiator, one that will remove all sediments, etc., without damaging the cooler, is to insert live steam into it, but the petcocks at the bottom of the radiator must be left open, else the fins will be subjected to an undesirable pressure.

ADJUSTING COILS.

A well designed induction coil should not draw more than .25 or .5 ampere to each cylinder with the motor running, and if the cylinders

miss with this adjustment, decrease the gap of the spark plug, provided, however, it is larger than that recommended for the system. In adjusting the vibrators it should be borne in mind that half a turn generally increases the current required from one-third to 1.5 amperes, considerably in excess of that needed to operate the coil efficiently. Keep the contact points clean and true and if economy be desired, adjust lightly or use an ammeter.

CURING SQUEAKS.

A body squeak is generally caused by it moving on the frame and the usual practise is to use oil to reduce the friction. A better method is to make a thin paste of Dixon's motor graphite and gasoline and apply it to the parts by means of a squirt gun or a feather. The gasoline will evaporate, leaving the graphite between the surfaces, and it is stated that this treatment will permanently cure the trouble.

AIR VENT IN CARBURETOR.

The air vent in the bowl of the carburetor should be kept free, as it is utilized to equalize the pressure between the fuel in the float chamber and the atmosphere. If the opening becomes clogged a vacuum will be created.

WATER JACKETED CARBURETORS.

The use of the hot water jackets of the carburetors is not necessary in warm weather, although some contend that the heat assists in the vaporization of the fuel.

LEAKING DIFFERENTIAL.

Announcement is made by the Dixon Crucible Company of the perfection of a lubricant for differential housings, one that will not leak out. It is a mineral oil product and contains no fats or tallow.

SUBSTITUTE FUNNEL.

If in need of a funnel while on the road, etc., and one is not obtainable, the bulb type of horn may be utilized. Remove the tube and reed before using.

NEW GARAGE LAW IN MASSACHUSETTS.

MOTORISTS and garage proprietors will be interested in the new garage law recently enacted by the Massachusetts legislature, portions of which went into effect May 15, and the remainder of which will go into effect Oct. 1. It would appear that the new statute would have an important bearing on all garages, public or private, hereafter to be constructed, and on all garages housing more than four machines now in existence.

The requirements for new garages, constructed after May 15, specify what locations are permissible and how near the various sizes of garages may be to other buildings. The following are the most important construction requirements:

Section 15—In any case where a building is divided by an unpierced fire wall from the foundation to one foot above the roof, each portion of such structure so separated shall be considered a building.

Section 16—All stairways or elevator wells and all air or light shafts in a garage shall be enclosed in fire resisting walls or partitions; and all elevator and stairway openings shall be protected with standard automatic closing fire doors, which shall be kept closed except when the openings are being used; except as otherwise provided in (c) of section 26.

Section 17—Wireglass in windows or skylights of garages shall not be less than one-quarter of an inch in thickness, with wire mesh not more than seven-eighths of an inch and wire not smaller than No. 24 B. & S. gauge.

Section 18—All skylights in a garage, located within 20 feet of any building of greater height than such garage, shall be of wireglass, with metal sashes and frames.

Section 19—No pit shall be allowed in the floor of any garage.

Section 20—All basements used for the storage of motor vehicles shall have one or more independent exits therefrom direct to the outside air, for use in case of fire.

Section 22—Except as otherwise provided by statute, no building or part thereof, inside of the fire limits of any city or town, shall hereafter be converted into a garage and used as such, unless such building or part thereof shall be of fireproof construction throughout, and no building or part thereof hereafter converted to such purpose outside the fire limits of cities and towns shall be used as a garage unless made fire resisting by covering the walls on the interior and the ceiling of such garage with metal lathe and hard plaster not less than three-quarters of an inch in thickness; such garages shall have cement concrete floors and shall otherwise be in accordance with these regulations.

That portion of the law which will go into effect Oct. 1 applies to buildings used as garages previous to May 15, and reads as follows:

Section 26—On or before Oct. 1, 1914, all existing buildings or other structures in any city or town used as garages, with capacity for housing more than four motor vehicles, shall be made to comply with the following requirements:

(a) The floor of the first story shall be covered with cement concrete not less than three inches in thickness.

(b) All first-story ceilings of garages that are more than one story in height, if constructed of combustible material, shall be covered with metal lathe and hard plaster not less than three-quarters of an inch in thickness.

(c) All stairways and elevator wells leading upward from the first story shall be enclosed in partitions covered with metal lathe and hard plaster not less than three-quarters of an inch in thickness, or sheet steel well lapped and securely nailed, or with some other fire resisting material.

(d) All doorways in said partitions to be fitted with iron frames and standard automatic closing fire doors.

(e) All windows in exterior walls, which expose dwelling houses, hotels, mills, factories, or places of public assembly within 20 feet, shall be fitted with wireglass and metal sashes and frames, or closed up solid with fireproof material.

(f) If the chief of the district police, or the official designated by him, so directs, any building of more than two stories in height, having a wooden interior in which a public garage is maintained, shall have a sprinkler system installed throughout the building except in such part as may be separated from the garage by unpierced fire walls and floors.

OFFERS MOTORCYCLE REGIMENT.

Federation of American Motorcyclists Can Furnish Men Within 30 Days.

President Patterson of the Federation of American Motorcyclists has wired the War Department at Washington that that organization can be prepared to place a regiment of motorcycle riders, 1000 men, in the field within 30 days. President Patterson states that nothing would please him more, in case of war, than to take command of such a regiment, and he feels certain that there are many seasoned captains in the organization capable of officering a company of riders.

The plan suggested is that the riders should either be formed into a single regiment, or divided into small companies to be used as dispatch bearers, scouts and patrols. Members of the Kansas Short Grass Touring Club have signified their desire to form a nucleus of this organization, to be supplemented by other F. A. M. riders all over the country.

The Centaur Motor Company of Chicago, agent for the Jeffery line, has adopted a plan of organizing weekly trips to the factory of the Thomas B. Jeffery Company, Kenosha, Wis., in order to give prospective buyers full opportunity to inspect the plant and note the methods employed in the construction of the product.

The Perkins-Campbell Company, Cincinnati, announces that its new Ford specialties and general catalogues are now ready. The former covers leather Ford goods and seat covers and latter lists leather specialties for automobile work.

FEATURES OF RAYFIELD SMALL CAR.

APPLYING the definition of the Cyclecar Manufacturers' National Association, the cyclecar made by the Rayfield Motor Company, Chrisman, Ill., is properly placed in the small car division. Its four-cylinder motor, with 2.75-inch bore and 4.5-inch stroke, has piston displacement of 106.9 cubic inches. The maker's rating is 18 horsepower. The wheelbase is 96 inches and the tread standard, 56 inches. The car weighs 700 pounds, fully equipped.

According to the circular issued by the maker, the Rayfield Motor Company is owned by the Rayfield Manufacturing Company. The concern is somewhat well known in the industry as maker of the Rayfield car, which has taken part in several contests, and which was represented in the international sweepstakes 500-mile

wheels carry 28 by three-inch tires, and the equipment includes Prest-O-Lite tank, gas headlights and rear lamp. A top, windshield and other equipment are supplied as extras.

USES PISTON VALVE MOTOR.

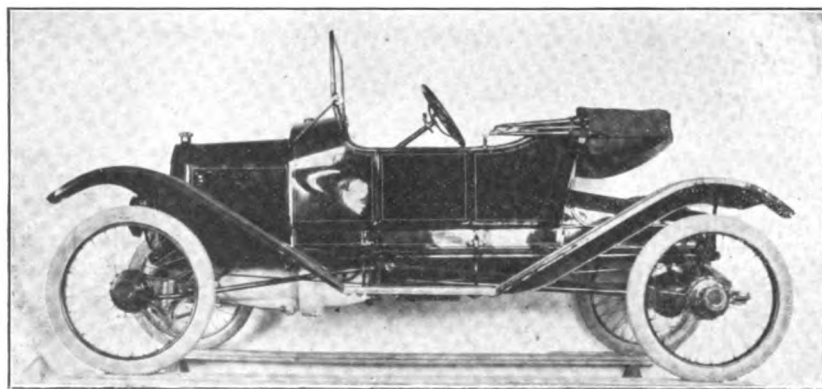
Twin City Cyclecar from Minneapolis Also Presents Other Innovations.

Although the Twombly Car Corporation, New York City, is the first cyclecar maker in this country to announce a machine utilizing a piston valve motor, the product of that concern is properly placed in the light car division, under the ruling of the Cyclecar Manufacturers' National Association. Moreover, the Twombly machines produced this year are utilizing a standard poppet valve motor. It would appear, therefore, that the first true cyclecar car to utilize a piston valve motor is the Twin City, recently announced by the Twin City Cyclecar Company, 804 South Ninth street, Minneapolis, Minn. It possesses other novel features as well.

The Twin City motor is a four-cylinder, air-cooled unit, with bore of 2.5 inches and stroke of 3.5, giving a piston displacement of 68.7 cubic inches. This is rated by the maker at 16 horsepower, but it is stated that it has developed 20 on the block. The operating speed is 2000 revolutions a minute. The piston valves are actuated by a patented mechanism, which is said to be similar to an eccentric movement, but differs in that a longer dwell is permitted when the valves are being opened, and a corresponding quicker movement when they are being closed. This mechanism runs in oil, and no springs, rollers, guides or tappets are used.

The spring suspension is another feature. Two double coil springs of vanadium steel are set crosswise of the frame at the front, while two others of the same size and shape run lengthwise of the frame at the rear.

The transmission is friction, and drive by single chain inside the frame. Wire wheels are used, carrying 28 by three-inch tires. The wheelbase is 101 inches, and the tread 36. The two passengers are seated side by side.



Rayfield Small Car, Designed by Men Responsible for Rayfield Carburetor.

race on Indianapolis speedway Memorial Day.

The designers of the Rayfield small car are William and John Rayfield, who first designed the famous Rayfield carburetor. They became interested in cyclecars in September, 1912, and their first machine was equipped with a motor-cycle engine, planetary transmission, V belt drive, etc. The present model is said to have been the result of long experimentation, and to be the first constructed with a four-cylinder, water-cooled motor.

Ignition is by Mea magneto and the carburetor was designed by the Rayfields. Lubrication is by constant level splash, maintained by means of a rotary pump. The sliding gear transmission affords two speeds forward and reverse, and drive is by shaft to a bevel gear rear axle. The springs are of the cross type, and are held to be unusually long so as to give extremely easy riding qualities. The two passengers are seated side by side with the driver at the left. The wire

SUGGESTIONS FOR THE NEW CAR OWNER.

Value of a Practical Knowledge of the Components of the Chassis--The Four-Cycle Motor Defined with Special Reference to the Model T Ford.

The second installment of the serial on the construction, operation, care and repair of the model T Ford deals with the strokes of the four-cycle motor, and the explanation of its operation will be of value to all new owners not familiar with the internal combustion engine, in that the principle involved is similar in all four-cylinder, four-cycle, poppet types.

AFTER the new owner has driven his car sufficiently to become familiar with its operation, it is not unlikely that he will be the recipient of considerable gratuitous advice from his friends as to its care and maintenance. It is very possible that these suggestions will not correspond with those given by the maker in the instruction book, which should be followed in preference to all others, as the manufacturer is best informed. Experimentation with the mechanism of the car is apt to be costly and the design cannot be improved upon by the novice.

Principles Involved.

While the instruction book gives directions, in the opinion of the writer, they do not deal sufficiently with the principles involved. The information obtained from a continuous study of the book must be memorized to be useful and it is a difficult task to remember the numerous instructions. It is obvious that the owner depending upon this book to extricate him from troubles experienced on the road will be involved in difficulties without the book to consult, and naturally must rely upon a passing motorist for assistance. Particular reference is made to the correction of minor troubles experienced with the ignition or fuel supply system, both of which should be thoroughly mastered.

A practical knowledge of the location, function and operation of each component of the chassis is not difficult to acquire and this, coupled with experience, will enable the owner to undertake long trips over all kinds of roads with confidence that he will be able to complete any ordinary repair.

Units of Chassis.

It is the intention of the writer to take up in logical sequence each component of the chassis, to describe its construction and operation, and to explain its relation to other members of the same group of units. As the chassis is composed of a large number of distinct units,

each of which is necessary to the proper operation of the whole, to clearly define this assembly, it will be divided into groups as follows: The motor itself, fuel supply system, ignition, lubrication, cooling, clutch, variable speed gearing, method of drive, rear and front axles, steering gear, springs, road wheels, frame and tires. For the particular benefit of the new owner and those contemplating the purchase of the car, the groups above referred to will be briefly explained.

Groups Defined.

The motor is an internal combustion engine, frequently referred to as a hydrocarbon engine. Its energy or power is derived from the explosion or burning of the mixture, which is composed of the vapor of gasoline mingled with air.

The ignition system is an electrical equipment which is productive of a spark in the cylinders of the motor, igniting the explosive vapor and at the predetermined instant. Means are also included for obtaining a high-tension current from a low-tension source of supply.

The fuel supply system includes a tank or container for carrying the gasoline, a device termed a carburetor, which mixes certain proportions of the fuel and air, and means for conveying this mixture to the cylinders.

Lubrication involves a supply of oil or grease to all parts subject to friction or wear, these including the components of the motor, transmission, rear axle, steering gear, etc.

Function of Clutch.

The clutch is a device which enables the operator to interrupt the energy of the motor, or in other words, the engine can be started and run without its power impelling the car. It serves several other purposes, among which is that of permitting the machine to be started without imposing undue stresses upon the driving mechanism. The variable speed gearing, also called the transmission, permits of a reduction of car speed without necessarily decreasing that of the motor. This is essential in addition to the usual gear reduction between the motor and the road wheels for, as will be explained later, the energy of the engine is developed by the number of revolutions of the crankshaft; that is, when the

latter is revolving slowly the power transmitted to the driving wheels is not as great as when the motor is turning at its maximum. The variable speed gearing is necessary for surmounting steep grades and where considerable resistance is encountered. It also provides means for reversing, or driving the car backward, as the crankshaft of the motor always rotates in the same direction when it is operating.

Rear Axle Assembly.

Under the head of the rear axle are included the differential, driving axles, brakes, springs, etc. The differential or equalizing gears, permit of turning corners. The driving axles transmit the power from the differential to the road wheels, and the two sets of brakes are utilized to

after it is ignited and a pressure is obtained that is turned into mechanical energy by mechanism. This energy is derived because the explosive mixture is confined or compressed, and when ignited the gases seek the path of the least resistance. This expansion or pressure is termed the firing or impulse stroke.

Elements of Motor.

The internal combustion engine consists primarily of a cylinder, a piston, a crankshaft and a rod connecting the piston to the crank of the shaft, as will be noted by reference to Fig. 2, which is a phantom view of the model T Ford motor published by courtesy of the maker. The cylinder is machined smooth and fitted in it is the piston which is provided with rings, utilized

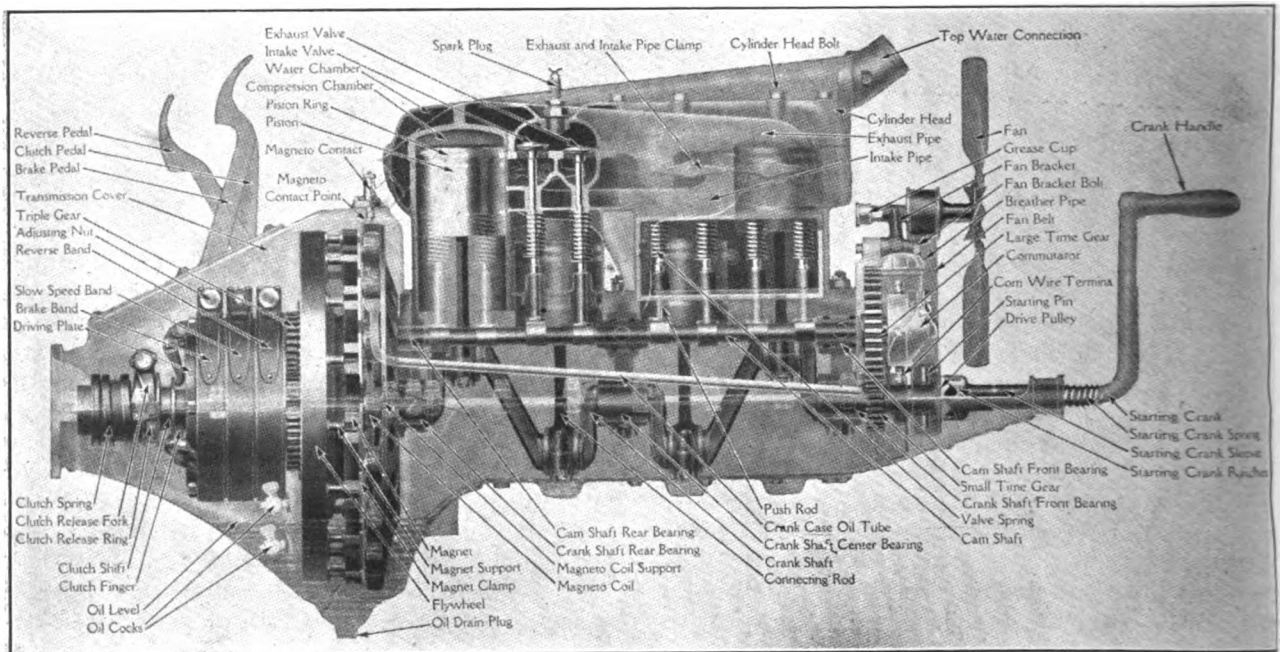


Fig. 2—Longitudinal, Phantom View of Model T Ford Motor, Showing the Location and General Arrangement of Its Components.

check or stop the movement of the machine.

The steering gear and its linkage enables the driver to control the movement of the front road wheels and the direction of the car. The springs are utilized to absorb road shocks, thereby protecting the mechanism from undesirable stresses. They also contribute to the comfort of the passengers and their construction has an important bearing upon the life of the tires.

Components of Motor.

Troubles of the gasoline motor are quickly located and remedied if one is familiar with its principles. The internal combustion motor is a form of heat engine because its power is derived from the burning of a gas vapor, which expands

to prevent leakages between the cylinder walls and the piston.

Operation of Motor.

Within the piston is mounted a wristpin on which the upper end of the connecting rod oscillates. The other or large end of the connecting rod is attached to the crankshaft, which in turn is secured to the flywheel. The operation of the crank and connecting rod is best understood by comparing its action with that of a grindstone actuated by the foot. The piston may be compared to the treadle, the connecting rod to the member attached to the treadle and crank, and the flywheel to the grindstone. The last named revolves because the crank is off

centre relative to the centre supporting shaft of the stone.

The object of the flywheel is to equalize the rotation of the crankshaft by storing up the force of energy, or the impulses, and giving it out again during the exhaust, intake and compression strokes. Were it not for the flywheel the motor would be driving the machine on each impulse stroke, and the car driving the engine at other times.

Power or Impulse Stroke.

Referring again to Fig. 2, it will be noted that a combustion chamber is formed by the piston, cylinder head and walls. If a combustible charge be placed in this space and exploded, the only member that can move will be the piston, which will be forced downward by the pressure of the expanding gases. As the piston descends it imparts a motion to the crankshaft through the medium of the connecting rod, and as this member is hinged at the ends and free to oscillate as the crankshaft revolves, the piston will be carried back again, when it reaches the lower end of its downward journey, by the momentum of the flywheel.

As the piston moves upward the burnt gases are expelled through an outlet, and the entire burnt charge is forced out when the piston completes its up-stroke. If another charge be introduced into the combustion chamber, and ignited, the power stroke will be repeated and the crankshaft will continue to revolve so long as the power impulses on the piston are continued.

Function of Valves.

Each cylinder is provided with two mechanically operated valves, an intake and an exhaust. The intake permits the mixture to pass into the cylinder during the suction or intake stroke, being opened and remaining so for a predetermined period of the stroke. It is closed during the succeeding or compression stroke, impulse and exhaust strokes.

The exhaust valve allows the burnt charge to escape at the proper time and after the useful energy of the explosion has been utilized. It is open, as is the intake valve, but one of the four strokes. Both valves are normally kept seated or closed by the tension of the valve springs, and are lifted or opened by the revolving cam, which actuates a pushrod and the valve stem. These components are clearly shown in the illustration and a little study will make clear their construction.

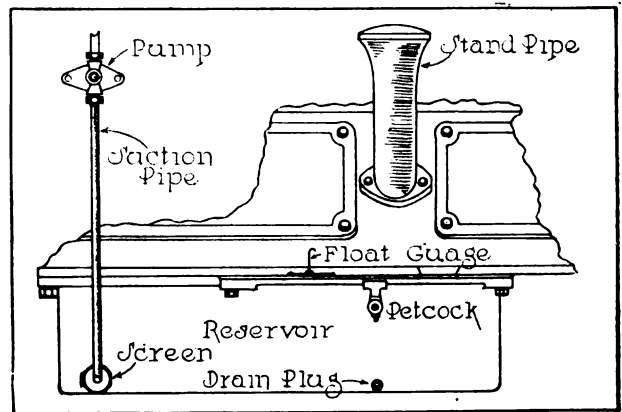
The motor has a cycle or series of four operations consisting of: First, suction (intake); second, compression; third, expansion (firing);

fourth, exhaust. They are accomplished in two revolutions of the crankshaft, corresponding to two downward and two upward strokes of the piston. As will be noted by Fig. 2, two pistons are up when the other two are down, and this and the number of revolutions necessary to obtain a power stroke should be well understood by the novice if he is to master valve timing.

EMPIRE 31 OILING SYSTEM.

The work of replenishing the supply of lubricant in the crankcase of a motor should not be hurriedly performed and the suggestions of the maker as to cleaning the oil reservoir and filter or screen should be complied with. The Empire Automobile Company, Indianapolis, Ind., maker of the Empire model 31, gives the new owner some good advice in this respect.

The system utilized for lubricating the motor



Components of Oiling System of Model 31 Empire.

is of the constant level splash, the oil being drawn from the reservoir in the lower crankcase by a plunger pump. The lubricant is screened before passing to the suction pipe, dash sight feed and bearings, and it is advisable to remove this screen and clean it.

When the float gauge indicates a supply of oil and the dash gauge does not show any lubricant dropping, the screen should be removed and inspected. Clean with gasoline but do not wipe with a cloth, as it may contain lint, which will clog the mesh.

Occasionally run a wire through the opening of the petcock, which is utilized to indicate when the proper oil level is obtained in replenishing. The float gauge is employed to denote the supply on hand when the level is below that indicated by the petcock. The contents of the crankcase are emptied by displacing a drain plug shown in the accompanying illustration.

COLORADO-TEXAS GOOD ROADS TOUR.

DURING the past two years, the people of the Southwest have been decidedly active in the construction of improved highways, and this applies particularly to the district represented by Colorado Springs, Pueblo and Manitou in Colorado. Recently, 32 members of the chambers of commerce in these three cities formed a party of tourists, intent upon preaching the gospel of good roads, over a route which hereafter is to be known as the Colorado-to-the-Gulf highway.

The tour was planned, and carried out in part, as a sociability run and to encourage the greater development of the main highways of the South-

west have been voted for improvement. Throughout Texas, Oklahoma and Kansas there is a growing sentiment in favor of good roads, and this sentiment is finding expression in the building of splendid highways.

Details of the Trip.

The party left the Garden of the Gods May 6, going by way of Walsenburg and Trinidad, across the Raton pass into Raton, N. M. Because of recent snows and rains on the pass, some difficulty was experienced the first day, but Clayton, N. M., was made the night stop. It was found that under normal conditions the roads throughout this portion of New Mexico would

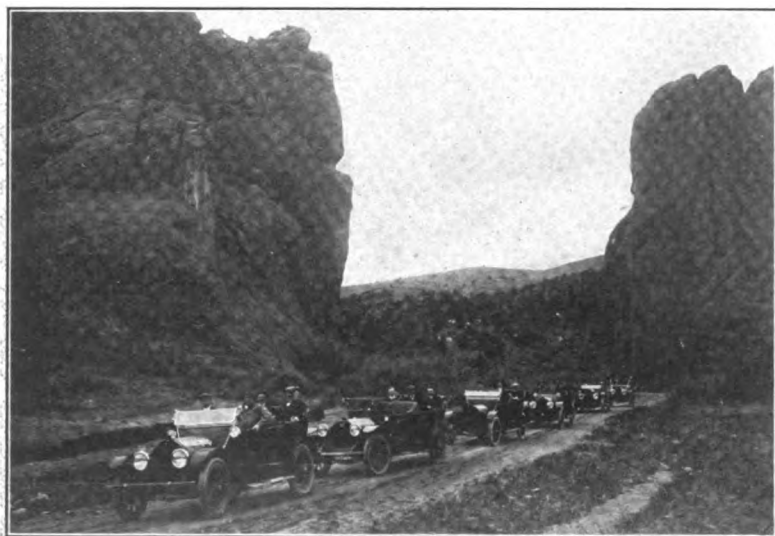
be good. At Texline the party entered Texas, and for the next 16 days the tour was entirely within that state.

Because the Canadian river had washed away the bridge, the Amarillo Chamber of Commerce arranged for the shipment of the cars from Dalhart to Amarillo, and the next morning found the tourists ready to resume their trip. Through the Panhandle country splendid roads were encountered, as well as constant evidences of recent activity and road development. Everywhere there was keen interest in the Colorado-to-the-Gulf highway, and a determination to make this a completely graded and developed route.

At Dallas, it was decided to change the original itinerary, go-

ing directly to Galveston. During this portion of the trip weather conditions were most favorable, but on the first day of the homeward journey, with the cars headed from Houston to San Antonio, heavy rains were encountered. Although the Coloradoans battled for three days against almost unprecedented flood conditions, they finally were forced to ship their cars home from Louise. Members of the party desire it distinctly understood that floods and not poor roads caused this change in plan. In fact, it is stated that had they been able to reach Wharton even a few hours prior to their actual arrival, it is highly probable they would have visited Victoria and San Antonio with little difficulty.

Governor O. B. Colquitt officially received the

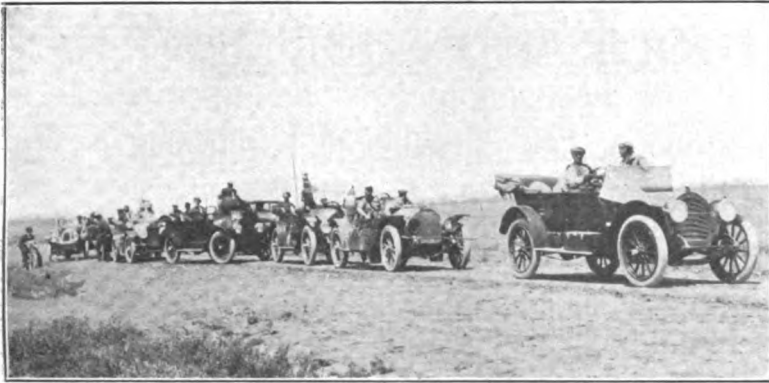


Colorado-Texas Tourists Leaving the Garden of the Gods, Near Colorado Springs.

west connecting the states of Colorado, New Mexico, Texas, Oklahoma and Kansas. Among the results were those of bringing the people of Colorado into closer acquaintance with those of the other commonwealths and of demonstrating not only the feasibility, but the pleasures of touring over the roads which are being developed rapidly in that section of the United States.

Found Road Conditions Good.

Road conditions, on the whole, were found to be good, and, considering the fact that the party followed, during the entire trip, the heaviest rains the Southwest has experienced in years, they were surprisingly good. Some poor ways were encountered, but the encouraging feature is that in most cases where these now exist work has either already been started or bonds



One of the Good Roads Typical of the Panhandle Division of Texas.

visitors at Austin, and expressed to E. J. Eaton, official representative of Governor E. M. Ammons of Colorado, his interest in the mission of the party, Texas' keen activity in good road development, and its desire to co-operate with Colorado in every way possible.

In Oklahoma and Kansas.

The return trip through Oklahoma and Kansas followed closely the original itinerary, although made by train instead of by automobile. Great interest was expressed all along the line in the mission of the trip. In Oklahoma the recent organization of the Oklahoma, Texas and Gulf Highway Association has given an impetus to road development, and it was found that in practically every county special efforts had been made to bring the roads to the best possible condition in anticipation of this tour. For this reason members of the party regretted exceedingly that they were unable to make this portion of the trip in their cars, but they were shown pieces of road at various points, which were an indication of the activity in progress.

Kansas, too, was found to be alive to good roads, many of which it already has. The Santa Fe trail, over which the return was mapped out, is a well graded and improved highway, and, while the travellers did not have opportunity to ride over any portions, glimpses of it from the train windows, both in Kansas and Colorado, indicated that it already is a splendid highway, with much improvement provided for this coming year.

After the party was compelled to take to the train, it was given several opportunities to travel over sections of highways. The Denison Chamber of Commerce and the Automobile Club of Denison escorted the party over a long portion

of the original itinerary, as did the people in Wynnewood and Pauls Valley. The Oklahoma City Chamber of Commerce signalized the completion of a 20-mile stretch of fine dirt road between that city and Edmund, by forming an automobile party for this portion of the journey. The Arkansas City Commercial Club piloted the visitors over the rock road between that town and Winfield, Kan.

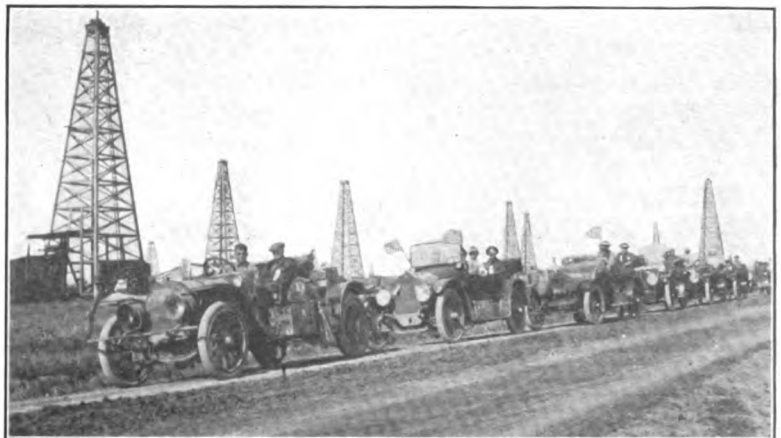
Despite the failure of the original plan, the tour was beneficial in every way, particularly in arousing enthusiasm in improved roads, both among those who took part therein and those with whom they came in contact en route.

WINS HIGHWAY CAMPAIGN.

Road Association in St. Joseph County, Indiana, Carries Local Election.

M. L. Williams, secretary of the Lincoln Highway Association of St. Joseph county, Indiana, writes that that organization was successful in its campaign to carry the road election held by the county commissioners May 28. The result was a big majority for a plan involving the laying of a centre strip of concrete 18 feet wide, backed up by six feet of gravel on each side, across St. Joseph county, which is expected to be completed this year.

This will close up one of the worst pieces of highway in the state, between South Bend and New Carlisle, a section with which many motorists are familiar. When the plans and specifications shall have been carried out tourists will be assured of 26 miles of road that is second to none.

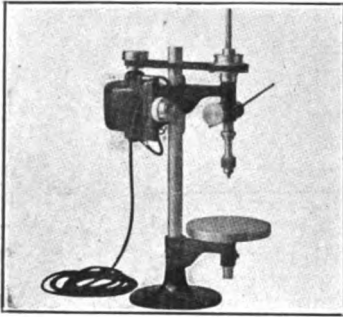


In the Oil Field District at Electra, Tex., on the Colorado-Texas Tour.

ELECTRICAL TOOLS AND EQUIPMENT.

Various Types of Portable Drills, Grinders, Etc., Capable of Completing a Wide Variety of Work at a Minimum of Expense.

THE practise of electrifying the repair shop and garage is becoming more general, and this is more specially noticeable in the tool equipment. The convenience of electrically operated machines appeals to the mechanic, and their use in many instances is a benefit to the customer, as considerable time is saved over the manually operated equipment. Where the drill, grinder, etc., are to be used occasionally, it is obvious that electric power results in economy in operation.



Portable Electric Drill Press.

PORTABLE DRILL PRESS.

Among the electrically operated tools is the portable drill press marketed by F. W. Lieberknecht & Co., Brookline, Mass. It can be placed on the floor, bench or directly upon the work to be drilled, and current supply is taken through the usual cord and lamp socket arrangement. It is held to be absolutely sensitive to a No. 70 drill, and its sensitivity can be adjusted by a spiral spring. Means are also provided for compensating for wear of the rack and pinion. Among other advantages claimed for the drill are the following: Platen will turn about its centre and about the upright column; depth of hole can be adjusted by a micrometer screw, which is not shown in the illustration; and drill press can be set directly on work for drilling vertical holes.

The specifications are as follows: Maximum diameter of drill, .375 inch; diameter of platen, 6.5 inches; maximum distance from chuck to platen, eight inches; face of driving pulleys, .75 inch; weight, 45 pounds; motor, .125 horsepower, alternating or direct current.

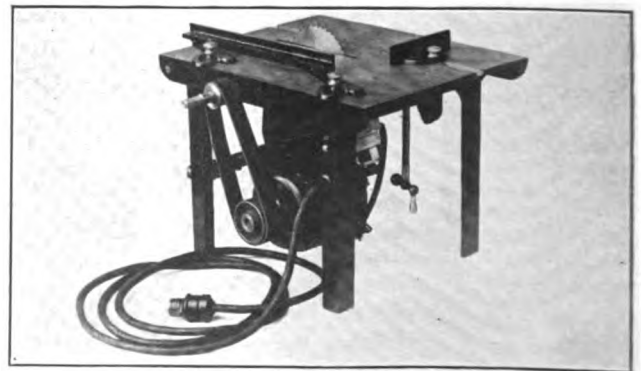
The same company is marketing a portable type of electric saw table shown in an accompanying illustration. It is held to be very efficient and economical of current, and to be well

constructed. The dimensions of the table are 12 by 14 inches. Its height is 12 inches and the maximum diameter of the saw is six inches. The tension of the belt is secured by the weight of the motor, which is either an alternating or direct current. A switch, plug and 10 feet of cord are supplied with each equipment, details and price of which will be supplied upon request.

CINCINNATI BENCH DRILL.

The Cincinnati Electric Tool Company, Cincinnati, O., is manufacturing a line of electric drills, and at Fig. 3 is shown the No. 0 combination sensitive bench drilling stand with a portable type of hand drill. The latter can be utilized independently of the stand, or as a sensitive bench drill, providing two tools in one. The hand drill is locked or released in a bracket, by means of thumb nuts. This tool is designed particularly for shops where both bench and outside drilling is to be done.

The stand is made to hold portable hand drills of .25, .375 and .5 inch capacities, and the drill bracket with drill can be set at any point on the column, and raised or lowered as desired. The weight of the drill and the bracket is counterbalanced by means of a spring on the column, and the drill is maintained in vertical alignment by means of a key on the bracket and keyway in the column. The depth of the hole to be drilled is regulated by a stop at the rear of the column. The lever feed is provided with a quick return.

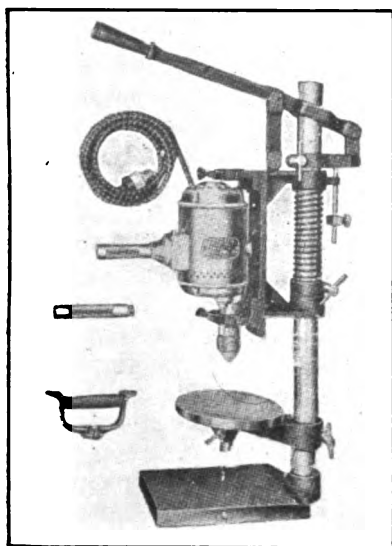


Lieberknecht Portable Electric Saw Table.

The height of the column is 30 inches and the distance from base to drill chuck is 14 inches when the bracket is set at its highest point. The distance from column to centre of table is five inches and the diameter of the latter is eight inches. The base dimensions are nine by 11 inches. The weight of the stand is 60 pounds. Larger stands are made with lever or hand feed wheel, to carry portable drills of .75, .875 and 1.25 inches capacity. The capacity of the drills is from .25 to .5-inch steel, according to the type. Complete details and prices will be supplied upon request.

STANDARD PORTABLE DRILL.

The Standard Electric Tool Company, Cincinnati, O., is marketing a line of high power universal portable electric drills, one of which is shown here-



Cincinnati Bench Drill.

low frequency circuits, 60 cycles or less.

The Standard drills are built on the unit plan, consisting of five units, and can be easily disassembled. All armature spindles run on enclosed ball bearings and thrust is cared for by ball bearings. The motors are of the series commutating type, gears of high grade hardened steel, and the make and break type of switch is located in the handle. Special attention has been paid to cooling and they are guaranteed not to heat under severe and continuous service. Extremely high power is emphasized in the design. In tests of the drill it has been demonstrated that it requires but one minute and 26 seconds to drill a .5-inch hole through two inches of steel.

Nine types are manufactured, these having a drilling capacity ranging from .25 to 1.25 inches

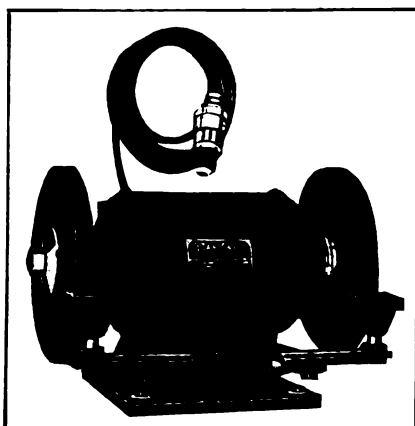
of steel. The reaming capacity varies up to .6875 inch. Spade handles are supplied with four types and feed screw or spade with five. The last named come equipped with No. 2 and No. 3

Morse taper socket, and breast plates are furnished when specified.

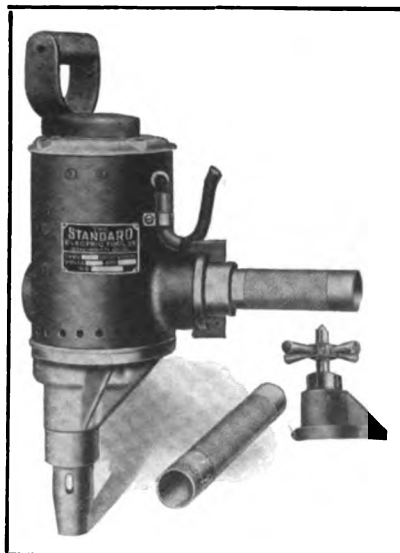
Each drill has variable speed, which regulates automatically up to its maximum capacity, and there is no racing. Standard tools will operate on all, no change in winding being necessary, only the voltage must be the same in each instance. They will also operate off any one phase of two or three-phase circuits of the same voltage, thus enabling alternating current power circuit connection where this is desirable. Each drill is carefully tested before shipment. The company issues a booklet giving details and prices, which will be mailed free upon request.

ELECTRIC GRINDERS.

The Standard Electric Tool Company also manufactures a number of high power, ball bearing portable electric grinders. Types 3B, 6B, 2Ba and 3Ba are similar in construction and one of these is shown in an accompanying illustration. They are constructed to be operated on alternating or direct current and are particularly adapted for grinding small tools, etc.



Standard Bench Grinder.

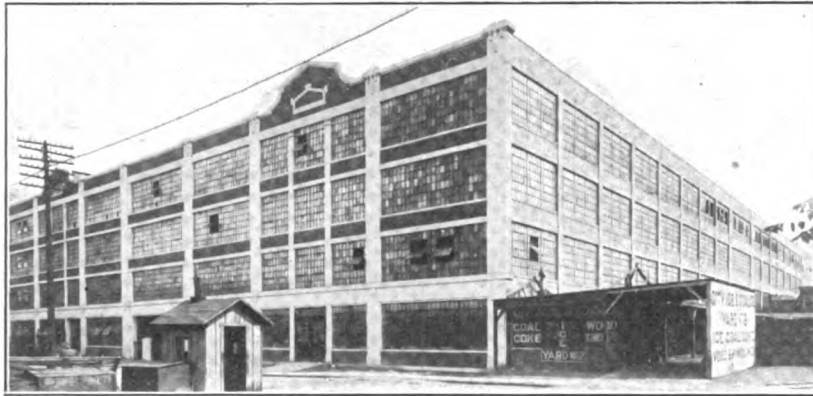


Standard Portable Electric Drill.

COLE'S NEW PLANT FORMALLY OPENED.

ONE of the important features of the week, in connection with the 500-mile race in Indianapolis, was the official opening of the new

hundred and eighty-three 60-watt lamps are used to light the building, and in this connection it may be added that the factory could be operated 24 hours a day without impairing the service, insofar as light is concerned. Fourteen-inch reflectors are equally spaced so that no shadow will be cast, making ideal working conditions.



General View of the New Building of the Cole Motor Car Company, as Seen from Market and Davidson Streets.

factory building of the Cole Motor Car Company, which had been under construction for nearly a year. This latest addition is 100 feet wide on the East Washington street side, 376 feet deep from East Washington to Market street, and has 132 feet frontage on Market street. Accompanying illustrations give some idea of its extent.

Over 500 tons of steel were used in the construction of the plant, and 13,000 tons of concrete. There are 15,814 panes of prism glass in the fenestra sash, exclusive of the offices. Placed end to end these would reach 4.5 miles. If the columns of the building were placed in the same manner they would extend 4676 feet into the air. The smoke stack rises 113 feet from its foundation and is one of the largest in the city. Nine

The floors throughout are of concrete. The latest type of construction is used in the employee's lockers, and rest rooms, modern plumbing, steel clothes lockers, sanitary drinking fountains and plenty of ventilation all supersede the old type of factory, with workmen's coats

hanging on a nail any place that happens to be convenient. Fireproof vaults provide spacious storerooms for each department's archives.

Many Cole owners and dealers were present when President J. J. Cole received the keys and opened the new structure. To these he made it plain that the factory and methods of the company always would be open to the public, to the end that owners and prospective purchasers might be in a position to acquaint themselves fully with the production of what has come to be known as the Standardized Cole. "We are proud of our new place", said he, "and the co-operation of the public. By this, I mean the general public all over the country. I feel sure that we will not only increase our production, but go steadily on building a good car at the right price".



Looking Down the Main Floor of the New Cole Building, Before the Machinery Had Been Installed.

SIoux CITY'S 300-MILE RACE IS NEXT.

WHILE there will be no opportunity for American manufacturers to regain the honors taken from them at the international sweepstakes 500-mile race until next Memorial Day, now that that event has been held interest is being centred in the 300-mile contest at Sioux City, Ia., July 4. It is as yet too early to give a list of entrants, but E. R. Schultz, manager of the Sioux City Motor Speedway Association, has been assured by W. F. Bradley, foreign racing representative, that many of the European machines will remain in this country to compete for the \$25,000 which the Sioux City Automobile Club, assisted by the business men of that city, has posted for the coming event.

Not all of the foreign drivers can be expected to take part, since some of them are entered for the international Grand Prix in France, which is scheduled for July 4. Delage, Peugeot and Sunbeam cars are also entered for the Grand Prix, but this does not mean that those machines which competed on the Indianapolis track will not remain in this country. It is understood that Christiaens' Excelsior and Friedrich's Bugatti already have been entered for the Sioux City race, and that there is a strong possibility that these men will drive them.

The situation thus presented is decidedly promising to those who are seeking another opportunity to test the relative merits of American and foreign built machines. The conditions under which the Sioux City event will be run are somewhat different than those obtaining on the Indianapolis speedway. The new track is a dirt course, of a character which packs well when oiled and rolled, and it is pointed out that foreign and American drivers would be on an equal footing with respect to knowledge of the track, since the race meet scheduled for June 30-July 4 is the first to be held thereon. The Indianapolis oval is paved with brick.

To carry this line of conjecture one step further: It may be suggested that if the foreign cars finishing at the head of the list Memorial Day were to be entered for the Independence Day contest, and these were to be manned by other drivers, there would be opportunity to judge whether the foreign machines really were so much faster than American cars, or whether it did not depend somewhat upon the man at the wheel. For this reason, if for no other, there is a strong desire to see the six countries represent-

ed in the 500-mile race again pitted against each other in the forthcoming event.

LOS ANGELES-PRESCOTT RACE.

An Effort Is Being Made to Establish a New Annual Event on the Coast.

Prescott, Ariz., is to hold a Frontier Day's celebration July 3-6, and the Prescott Automobile Club has sought the assistance of racing promoters in Los Angeles in arranging for a Los Angeles-Prescott road race during that week. It is more than probable that the contest will be held and that it will be made an annual event.

The distance between the two cities is about 320 miles, and it is proposed to hold the race under similar regulations to those governing the annual Los Angeles-Phoenix race, which usually takes place in November. There will be one difference, however. The roads between Los Angeles and Prescott are said to be ideal. And, it is added, the weather conditions in July are such as to preclude all possibility of rain or other disturbances.

The last 44 miles of the course lies over the Prescott Loop, so-called, a stretch of road winding through mountains and valley, that is recognized as one of the fastest in the country. It was built entirely by funds provided by the Prescott Automobile Club. Automobile races will be held over this portion of the course in any event, 10 entries already having been received.

HAYNES FOR RUSSIAN CONTEST.

President of Odessa Automobile Club Will Drive One in Moscow Event.

Announcement already has been made in these columns that the Russian Imperial Automobile Club has arranged a cross country reliability run to be held over a course leading from Moscow to Odessa in August. At least one American car will be represented in the event, since the president of the Odessa Automobile Club has purchased a 1914 model Haynes, equipped with electric gearshift and made by the Haynes Automobile Company, Kokomo, Ind., which he will enter and drive in this contest. The Haynes took part in its first competition in 1895, when it won a prize of \$175 in the Chicago Times-Herald race.

AMERICA'S INITIAL CYCLECAR RUN.

WHAT will go down in automobile history as the first American cyclecar run was held under the auspices of the Cyclecar Club of New England, May 30-31, the itinerary being from Boston to Springfield and return. Nine machines took part in the event, the roll of honor, if such it may be termed, reading as follows: E. P. Blake, G. W. Weldon, A. G. Frezoli, W. W. Watson and R. D. Brazeal, Imp; H. R. Bard and R. G. Shaw, Mercury; E. A. McGrath, Dudley Bug, and Arthur P. Young, Trumbull.

These nine and some others, passengers, left the headquarters of the club, Hotel Oxford, Boston, at 9:30 Memorial Day morning, and proceeded to Wellesley, South Framingham, Marlboro and Worcester, where a stop was made for lunch at the Hotel Bancroft. Thence the way led through Leicester, Spencer, Brookfield, Warren and Palmer to Springfield.

This first day's run was without special incident, the roads being exceptionally good over this portion of the trip. Absolutely no trouble was experienced in negotiating the hills. Of course there was plenty of excitement, since this was the first opportunity that had been afforded in many of the towns to view the little machines, and full advantage was taken of this fact. Every time the tourists stopped they were immediately surrounded by a crowd of interested prospective buyers.

After a banquet at the Hotel Kimball the evening was spent in calling the attention of Springfield enthusiasts to the merits of the various products represented, and, Sunday morning, an early start was made up the Connecticut valley, through Holyoke, Northampton and Deerfield to Greenfield, where luncheon was served at the Hotel Wendell. Nothing but good roads was encountered that morning.

Crossing the Connecticut at this point the little machines made their way to Athol, some portions of the trip affording abundant opportunity to test their hill climbing ability. The way to Gardner was over a splendid new piece of macadam, and it was 5 in the afternoon when the party stopped in Pittsfield for dinner. Here the owner of a Rocket machine joined the tourists for some little distance, the route lying through Lunenburg, Ayer and Harvard to Concord. Inasmuch as some members of the party lived in Lawrence, the tour officially came to an end in that city, although the Boston members re-

turned to the Hub by way of Lexington and Arlington.

The affair was a decided success, both as a demonstration of the roadability of the machines and as affording a splendid opportunity to call the attention of the public to them. Immediately after the return to Boston the board of directors of the club decided to hold a series of such events. The next run will be held the latter part of June, going north and east from Boston, while another is being arranged to go toward the south shortly thereafter.

TIRES BURST RIMS.

Some Remarkable Results in Tests Conducted by Goodyear Tire & Rubber Company.

One of the mechanical marvels of the age is the pneumatic tire, according to officials of the Goodyear Tire & Rubber Company, Akron, O., which has been conducting a series of tests during the past six months to determine rim strength. These experiments were made for the Society of Automobile Engineers, and practically every type of rim, clincher and straight side, was used.

The method consisted in taking Goodyear tires out of stock, putting them on rims to be tested and forcing air into the tires until something gave way. The rims, of course, were not mounted and were not reinforced by wheels. It is significant that not a single tire gave way.

The tests were severe. Some tires were inflated to 400 pounds to the square inch before the rim reached the limit of endurance and collapsed suddenly. It is stated that actual figure 8's were made of sturdy steel, and that in many cases the same Goodyear tire was used for a number of tests, breaking one rim after another—some tires being used as high as 14 times.

The office of the H. W. Johns-Manville Company in Duluth, Minn., has been removed to larger quarters at 327 West First street, the change being necessary in order to take care of the increased business. The new office is located on the ground floor, with ample opportunity for the display of automobile accessories and other products of the company, the headquarters for which are at Madison avenue and 41st street, New York City.

BAILEY ELECTRIC MAKES NEW RECORD.

IT WILL be remembered that Col. E. W. M. Bailey, treasurer and general manager of S. R. Bailey & Co., Amesbury, Mass., successfully accomplished a tour from Boston to Chicago in October, 1913, utilizing a Bailey electric roadster, made by that concern. This make of machine has several distance records to its credit, but it is maintained in addition that it is the first electric car to go over the road from Boston to New York City in 24 hours.

This latest record was established May 14-15, the car leaving Boston at 4:12 in the morning of the 14th and arriving in New York City at 3:21 the next morning. A detailed statement of the run is to be found in an accompanying table, which shows that the total mileage was 247.8, this being covered in an elapsed time of 23:09:00, and a running time of 10:52:00.

On the Chicago trip the daily mileage ran as high as 173.5, between Syracuse and Buffalo, N. Y., while on its first day out the car covered the 161 miles between Boston and New Haven. It may be stated, however, that on that trip no attempt was made to set up a daily record, since the main object was to demonstrate that an electric could be utilized to advantage for long distance touring.

The car used in the most recent journey was a stock Bailey electric roadster, equipped with 60 cells of A-5 Edison battery, made by the Edison Storage Battery Company, Orange, N. J. Current was charged into the battery at convenient points along the way when stopping for meals and for rest. The company holds that the average speed of 22.8 miles an hour compares very favorably with that of gasoline machines.

GLIDDEN TOUR ENTRIES.

Latest Details of the Plan for the Reliability Run and New Hampshire Outing.

Highway commissioners from the six New England states will be present at the midsummer outing of the American Automobile Association, at Bethlehem, in the White mountains of New Hampshire, July 4-6. These are S. Percy Hooker, New Hampshire; W. D. Sohler, Massa-

chusetts; Charles C. Gates, Vermont; Lyman H. Nelson, Maine; Charles J. Bennett, Connecticut, and Robert B. Treat, Rhode Island. In view of this fact, plans have been laid for a good roads convention on the closing day of the outing.

The outing will follow the completion of this year's national reliability tour, more generally known as the Glidden tour, which will be a non-stop event, starting from Chicago, June 29, and ending in Boston, July 2. Entry blanks may be secured by addressing the members of the committee as follows:

Lewis R. Speare, Cambridge, Boston, Mass.; F. X. Mudd, Fisher building, Chicago, Ill.; Charles G. Janus, P. O. Box 1400, Columbus, O.; Laurens Enos, 621 Main street, Buffalo, N. Y.; Robert P. Hooper, Cherry and Juniper streets, Philadelphia, Penn.; Dr. H. M. Rowe, Harlem square, Baltimore, Md.

Entry blanks and information may also be secured from the headquarters of the American

DETAILS OF BAILEY ELECTRIC BOSTON-NEW YORK RUN.

Left Boston 4:12—	Arrived	Left	Miles	Time Run- ning	M.P.H.	Time Not Run- ning	Time Boost- ing	Amp.- Hrs.	Amp.- Mile
Worcester	5:58	8:29	42.5	1:46:00	24.0	2:31:00	1:55:00	141	3.82
Springfield	10:37	2:10	51.7	2:08:00	24.2	3:33:00	3:10:00	150	2.90
Hartford	3:13	4:00	27.3	1:03:00	26.0	47:00	33:00	87	2.30
New Haven	5:47	9:27	41.2	1:47:00	23.1	3:40:00	3:15:00	120	2.91
Stamford	11:17	1:03	42.0	1:50:00	22.9	1:46:00	1:30:00	117	2.79
New York	3:21	...	43.1	2:18:00	18.9	.....	.....	138	3.20
Boston-Stamford .....	...	...	204.7	8:34:00	23.9	10:31:00	8:53:00	615	3.00
Boston-New York .....	...	...	247.8	10:52:00	22.8	12:17:00	10:23:00	753	3.04

Automobile Association maintained at 437 Fifth avenue, New York City, and in the Riggs building, Washington, D. C.

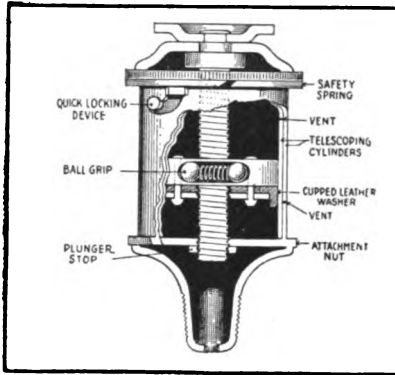
The K-W Ignition Company, Cleveland, O., states that it has the sole right to apply the words "Road Smoothers" to devices intended to have a shock absorbing action. The road smoothers made by this concern are a combination of helical spring to take up the shock, an air chamber to check the rebound and anti-side motion links to prevent side rocking and consequent skidding in turning corners.

Officials of the Panama-Pacific exposition announce that it has definitely been decided to hold the Vanderbilt Cup race Feb. 22, and the Grand Prize event March 5, 1915.

The Japanese government has decreed that in the future license cards shall be carried on the steering column.

EQUIPMENT, TOOLS, FITTINGS AND SUPPLIES.

WILLIAM J. Bailey, 407 Mulberry street, Newark, N. J., is marketing the Climax grease cup, a cut-away section being shown here-



The Climax Grease Cup.

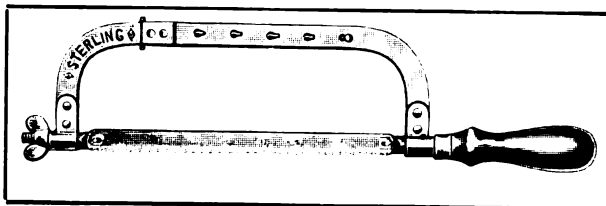
with to depict the construction. It is of the compression type, and it is stated that the top cannot drop off, even if the cup should be inverted. A slight pressure downward and to the left re-

leases the inner cylinder, enabling easy filling, or the outer cylinder may be supplied if desired. The cylinders are of drawn brass tubing and a close telescoping fit, preventing leakage and the entrance of road dust. The cylinder caps are of heavy brass, hard soldered to the cylinder, and the air vents in both cylinders are so located that renewing the supply of lubricant is very easy. When withdrawing the inner cylinder these air vents prevent suction, as well as the grease coming away with the part. A double ball grip is employed to prevent the plunger turning and wear. The Climax grease cup is produced in standard and special sizes. Prices will be supplied upon request.

STERLING HACKSAW BLADES.

One of the most important and useful of small tools in the garage, repair shop and service station is the hacksaw blade. It is employed to cut metals of all kinds, tubing, pipe, steel, iron, brass, etc., and to obtain satisfactory results it is necessary that a blade be used that will obtain the best general service on all such metals.

It is the opinion of practical hacksaw makers

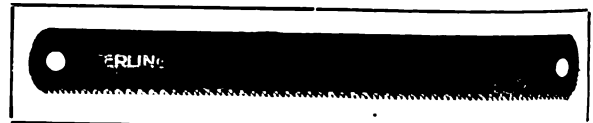


Sterling Adjustable Hand Hacksaw Frame.

that a medium pitch blade about 24 teeth to the inch, in a 12-inch blade about .625-inch wide, and in an eight-inch blade, .5-inch wide, should give the best general results without the operator continually being obliged to shift the blade in the frame for different classes of work.

The Diamond Saw & Stamping Works, 361 Seventh street, Buffalo, N. Y., specializes in hacksaw blades and frames, and the Sterling trade mark is well and favorably known to the trade. An accompanying illustration shows its adjustable frame, which takes eight, nine, 10, 11 and 12-inch blades. The frames are light, strong in the centre, and can be quickly and easily adjusted to take the blades named. The blade is adjustable to four different angles. The frames come nickelled or polished.

The company also manufactures solid frames for eight, nine, 10, 12 and 14-inch blades. These are constructed of high grade material and are nicely finished. In addition to producing blades for hand frames and of different thickness,



Sterling Hacksaw Blade.

length, width, teeth, etc., the company makes a large variety of blades for power machines. Descriptive matter and prices will be mailed free upon request.

UNI-COIL FORD IGNITION.

The New York Coil Company, 338 Pearl street, New York City, manufacturer of master vibrators and other well known accessories for the model T Ford car, has just placed on the market the Uni-Coil ignition system, which is especially designed to operate on the Ford fly-wheel alternating current magneto.

The system consists of an elevated gear bracket attachment, which is clamped to the end plate of the motor after first removing the regular timer. Bevel gears transmit motion to a vertical shaft running through the bracket upon which is mounted a combined timer and high-tension distributor, or synchronizer, as it is termed. The new system eliminates all of the old wiring with the exception of a single lead, connection being made to only one unit of the coil box. A

cable runs from the distributing part of the apparatus and is connected to the high-tension terminal of the same unit. The timing or circuit



Uni-Coil Ford Ignition System.

operating mechanism within the distributor is almost identical with that employed in regular magnetos.

The maker claims that the system times the spark perfectly and is the first to operate satisfactorily on the flywheel magneto. There is but one adjustment and troubles heretofore experienced with the Ford timer are eliminated. The system is easily cared for. Claims are further made to the effect that the system con-

tains all the desirable features of the high-tension magneto. Instructive literature fully explaining the device in detail will be sent upon request.

ECONOMY WELDING OUTFIT.

The Economy Welding Machine Company, Kansas City, Mo., specializing in welding equipments, is marketing what is known as the Economy Junior outfit. It was designed to meet the demand for the moderately priced high grade equipment, and one of its qualities is the provision made for generating the acetylene gas, a feature that will appeal to those not conveniently located to a source of supply.

As will be noted by the accompanying illustration the outfit is mounted upon a substantial wooden platform, which is 30 by 53 inches and fitted with roller bearing caster wheels. This permits of moving the apparatus in proximity to the work.

The oxygen generator is a steel storage tank, 16 by 48 inches, and the steel wash bottle is eight by 48 inches. All are constructed for 200 pounds working pressure and are tested to 300. The generator is provided with an Economy oxygen relief valve, regulating valve, high and low pressure gauges, stop pressure valves, hose connections, drain cocks, etc. The steel retort is five by 21 inches, fitted with gas or gasoline burners.

The acetylene pressure generator is 18 by 48

inches, oxy-acetylene welded, and tested to 20 pounds working pressure. The carbide hopper has a capacity of 25 pounds, and the carbide is fed by a hand feed of special design.

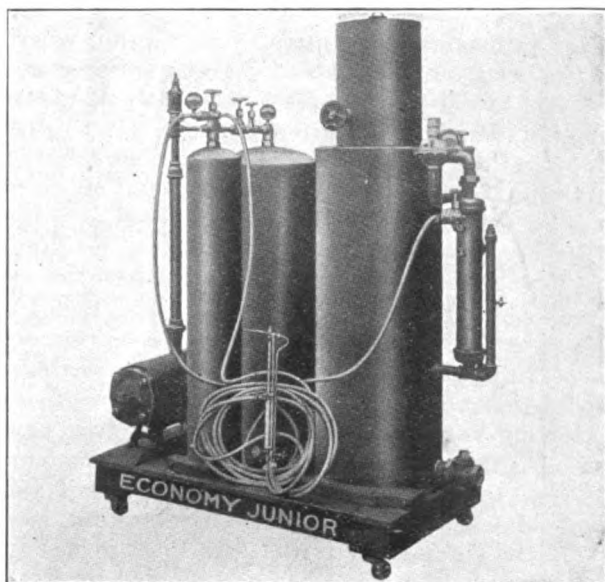
The balance of the equipment includes the Economy diaphragm relief valve, with gas tight bonnet connecting with relief pipe; regulating valve, flash back preventer, drying and filtering chamber, pressure gauge, hose connections, two-inch drain valve, etc. The torch is the No. 1 style, and has seven welding tips, numbers 1 to 7, and a removable cutting attachment with three tips. The company is issuing a pamphlet on welding which will be mailed free upon addressing the home office.

CINCINNATI BALL JOINTS.

The Cincinnati Ball Crank Company, Oakley, Cincinnati, O., is marketing a ball joint for spark and throttle controls. One of the qualities of the design is the use of an internal spring construction which takes up wear, eliminates noise and prevents backlash or lost motion. It comes completely assembled, 100 to the box.

SLOCOMB MICROMETER.

The J. T. Slocomb Company, 29 Oxford street, Providence, R. I., is manufacturing the Slocomb micrometer, which is constructed to withstand severe service without affecting its accuracy. It is made in all styles and sizes and comes with inch or metric measurements.



Economy Junior Welding Equipment.

CURTISS FLIES ORIGINAL LANGLEY PLANE.

WHILE the Wright brothers are justly credited with being the first persons ever to fly in a heavier-than-air machine, they have at all times acknowledged the debt they owed to the experiments carried out by Prof. Langley of the Smithsonian Institution, who was the first to design a machine of this type that would fly. The Langley biplane, or aerodrome as it was called, fitted with a steam engine, made its first free flight over the Potomac river, Dec. 12, 1896, covering over a mile in the air, but without a passenger. Subsequently, in 1903, at least two attempts were made to fly Langley machines, fitted with an internal combustion engine and carrying a pilot, but in each instance the machine was wrecked while being launched from a catapult on top of a house boat.

The entire aviation industry has freely acknowledged its debt to Prof. Langley, and his name receives highest honors among aviators and designers today, although at the time of his death, and for some years previous, his machine always was referred to as "Langley's Folly". Recently, Dr. Charles D. Walcott, secretary of the Smithsonian Institution, and Dr. A. F. Zahm, recorder of the Langley Aerodynamical Laboratory, conceived a plan for completely vindicating the Langley design—not Langley's memory, for that needs no vindication today.

Glenn H. Curtiss was selected to take charge of the experiment, and the original Langley aerodrome was taken to Hammondsport, N. Y., from the Smithsonian Institution, Washington, where it has been on public view for a number of years. In this machine, May 28, 1914, nearly 18 years after it was first assembled, Glenn H. Curtiss flew over the waters of Lake Keuka, carrying not only the weight originally intended, but an overload of 340 pounds, this extra weight being in the form of pontoons and other fittings to facilitate launching from the surface of the water.

The machine itself was the original Langley aerodrome, the only changes in its construction, aside from the pontoons and launching fittings, being the replacement of a few broken ribs, resurfacing for the wings and one or two new wires. The original gasoline motor was employed, the original propellers and all of the original framework. The result, therefore, is a complete vindication of the principles of design and construction developed and applied by Prof. Langley.

Immediately after the successful termination of the test, Dr. Walcott issued a public statement setting forth the objects of the experiment as follows:

I was well pleased with the launching this morning. Although the machine and pilot weighed 340 pounds more than the machine and pilot of 1903, it rose gracefully from the water on the very first trial, and maintained remarkable stability both in the air and on the water. I assigned to Mr. Curtiss the task of rehabilitating the original machine and of testing it over the water, first, for the purpose of vindicating Dr. Langley's design, and second, to ascertain the practical value of his design in the present state of aviation. It is my hope that succeeding trials will amply justify the good opinion which aeronautical engineers, both here and in Europe, have long entertained of Dr. Langley's design.

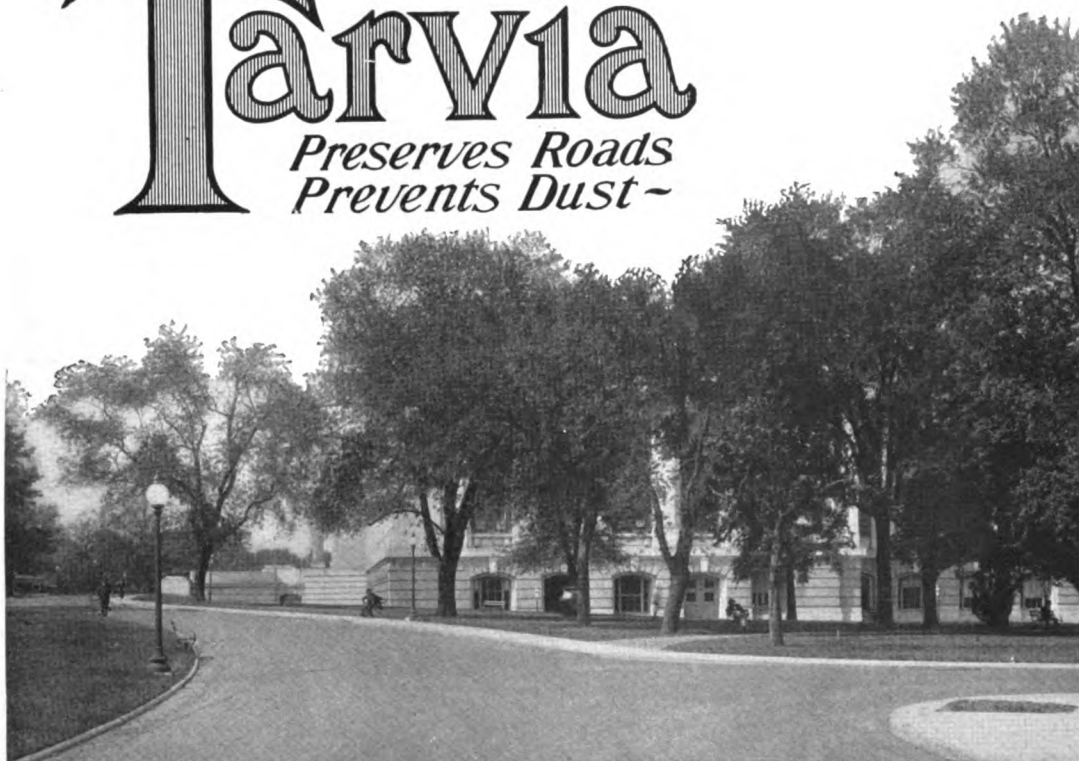
The one man more closely in touch with Prof. Langley and his work than any other, unless it may have been Octave Chanute, a Chicago engineer, whose experimental gliders became the forerunners of the first Wright biplanes, was Dr. Alexander Graham Bell, inventor of the telephone. Dr. Bell observed several of Prof. Langley's earlier experiments, including the first actual flight of 1896, and with the latter's permission wrote the reports later published officially by the Smithsonian Institution. Within a few months after Prof. Langley's death, Dr. Bell formed the Aerial Experiment Association, with which were also associated Lieut. Thomas F. Selfridge, U. S. A.; F. W. Baldwin, J. A. D. McCurdy and Glenn H. Curtiss. As a result of the work done by these persons the first Curtiss biplanes were constructed and flown. As soon as Dr. Bell heard of the successful flight of the Langley aerodrome he telegraphed Curtiss as follows:

Congratulations on your successful vindication of Langley's drome. This is the crowning achievement of your career, at least, so far. My best wishes for your continued success.

Already the success of this latest experiment has reawakened interest in the patent litigation, which has been under way between the Wright Company, the present owner of the Wright patents, and Glenn H. Curtiss and others, and which was decided recently in favor of the plaintiff. It was maintained by those interested in the defense that practically all present aeroplanes embodied principles worked out to a successful conclusion by Prof. Langley, before the Wright brothers actually made flight. What effect, if any, this most recent demonstration will have upon reopening the litigation, it is too early to determine.

Tarvia

*Preserves Roads
Prevents Dust—*



This road is three years old—

Roads around New National Museum,
Washington, D. C., Constructed
with "Tarvia X".

HERE is a Tarvia-built road that for three years has carried the heavy traffic of sightseers to the New National Museum in Washington.

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Tarvia is a dense, viscid coal tar product of

great bonding power. It introduces an element of plasticity in the roadway that binds the stone in a tough matrix. Internal friction under heavy loads is prevented. Water runs off the surface instantly, and the tarviated macadam will not ravel on slopes. The surface is automobile-proof, producing no dust.

Tarviated macadam in the end costs no more than ordinary macadam—its first cost is a little higher, but its maintenance cost is very much lower.

Tarvia is made in three grades: "Tarvia X" is suitable for building Tarvia-macadam roads; "Tarvia A" and "Tarvia B" are thinner grades suitable for roads already in use, to preserve them and make them dustless.

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When Writing to Advertisers, Please Mention The Automobile Journal.

NEWS OF THE MANUFACTURER AND DEALER.

The following concerns have been incorporated recently to manufacture or deal in automobiles, accessories, etc.:

Winslow Automobile Company, Fort Smith, Ark.; \$5500; to deal in automobiles; L. F. Brock, R. N. Winslow, S. L. Williams.

Pike Rubber Company, Akron, O.; \$50,000; to manufacture and deal in rubber goods; O. C. Pike, F. Grether, F. Selzer, V. R. Hardy, E. V. Hammaker.

Blair Auto Supply Company, Blair, Wis.; \$2500; to operate a garage; C. J. Gibson and others.

Lawson-Pratt Sales Company, Boston, Mass.; \$5000; to conduct an automobile business; D. Lawson, R. T. Pratt, E. B. Stanwood.

Tomberg Auto Company, Brooklyn, N. Y.; \$1000; to conduct an automobile business; C. Tomberg, W. P. Finn, S. Barson.

Lomar Motor Car Company, Chicago, Ill.; \$1,000,000; to manufacture automobiles.

Ghezzi Vehicle Fenders Company, New York City; \$10,000; D. Ghezzi, F. Tauro, A. Zerbarini.

Far Rockaway Motor Bus Line, Cedarhurst, N. Y.; \$210,000; G. W. Foran, C. A. Johnson, T. A. McWhinney.

South Side Machine & Auto Company, Clintonville, Wis.; \$15,000; to operate a garage; W. Splittgerber, F. Gerbert, A. Poetter.

Astoria Taxicab Corporation, New York City; \$3000; G. L. Doyle, W. F. Wund, A. V. Kenealy.

Dobbins' Automobile Exchange, Newark, N. J.; \$50,000; H. W. Dobbins, Jr., G. Dobbins, D. C. Dobbins.

Pneumatic Shock Absorber Company, Philadelphia, Penn.; \$100,000; to manufacture automobiles and supplies; F. R. Hansell, George Martin, S. C. Seymour.

Henderson Transportation Company, Watertown, N. Y.; \$5000; to conduct a motor car business; R. W. Butterfield, L. D. Butterfield, J. Nellis.

Gillen-McVean Ambulance Company, Youngstown, O.; \$10,000; to conduct an ambulance and taxicab business; A. F. Gillen, W. V. Gillen, D. McVean, J. I. McVean, F. A. Orseifer.

Auto Tire Corporation, Indianapolis, Ind.; \$25,000; to deal in automobile tires, accessories, etc.; Walter Myers, A. A. Clark, K. W. Gant.

Western Coast Automobile Company, Los Angeles, Cal.; \$75,000; to conduct an automobile business; R. J. McCarthy, R. J. McIntyre, W. T. Sprouls.

Lower Falls Garage Company, Wellesley, Mass.; \$5000; to conduct a garage; D. A. Baldwin, G. R. Williams, N. J. McGaffin.

Croswell Auto Company, Croswell, Mich.; \$5000; to deal in automobiles.

Detroit Air Pump Company, Detroit, Mich.; \$100,000; Alexander F. Sterling Blackwood, David G. Barnett, Emanuel T. Berger.

United Light Company, Cincinnati, O.; \$5000; to deal in electric supplies; W. H. Odell, William R. Divers, Albert D. Alcorn, Grace Divers, Frank A. Cooper.

Chelsea Manufacturing Company, Newark, N. J.; \$100,000; to manufacture motors, engines, etc.; E. R. Milles, L. E. Hall, O. F. Root.

American Militaire Cycle Company, Cleveland, O.; \$100,000; to manufacture and deal in motors and motorcycles; M. L. Thomsen, E. Frederick, A. Henry, Vernon E. Davis, H. E. Downing, M. H. Gallagher.

R. K. Mickey Company, Bloomfield, N. J.; \$50,000; to manufacture electric lamps for automobiles, etc.; R. McNeill, M. L. Mickey, R. K. Mickey.

Merkel & Spacher, Rochester, N. Y.; \$15,000; to conduct a bicycle and motorcycle business; C. A. Merkel, Joseph G. Merkel, George M. Spacher.

United Anchor Tire Company, New York City; \$2000; to deal in automobile tires; Frank H. Cross and others.

Delcher & Arndt Company, Plymouth, Wis.; \$50,000; to operate garage and machine shop; Adam Delcher and others.

Wake Auto Company, Raleigh, N. C.; \$25,000; to conduct a general machine and repair shop; W. G. Allen, O. B. Penny, Frank Allen, E. H. Baker, F. H. Phillips, J. W. Harden.

Bradley Electric Garage Company, Dayton, O.; \$10,000; to conduct an automobile, garage and accessory business; Albert T. Miller, T. H. Hlester, Francis Bradley, Frank Blessing, L. E. Bradley.

Dixie Auto Supply Company, Louisville, Ky.; \$6000; to deal in automobiles; A. H. Drake, H. Jansen.

Motor Sales Company, Louisville, Ky.; \$6000; H. O. Herr, A. W. Lee, Jr., R. W. Herr, Jr.

Auto Comfort Robe Company, Gloversville, N. Y.; \$25,000; to manufacture Comfort automobile robes.

Thiefproof Auto Lock Company, Dover, Del.; \$50,000.

Jaegers Manufacturing Company, Dover, Del.; \$400,000; to manufacture motor trucks, engines, etc.; Walter P. Garrow and others.

Euclid Penn Auto Supply Company, Cleveland, O.; \$20,000; to deal in automobile supplies and accessories.

Auto Combination Switch Lock Company, Columbus, O.; \$10,000; to deal in accessories.

Canadian Bartlett Automobile Company, Toronto, Ont.; \$1,000,000; to manufacture automobiles.

Flanders Electric Company, Pontiac, Mich.; \$100,000; to manufacture automobiles; M. Rothschild, Don C. McCord, B. F. Edgar.

Panama Equipment Company, St. Louis, Mo.; \$5000; to deal in automobiles; H. F. Herfuth, John F. Schneider, Garfield G. Giese.

Mattison Taxicab & Transfer Company, Minneapolis, Minn.; \$100,000; Allen M. Crowell, Charles S. Mattison, Frank S. Mattison.

GARAGE AND DEALER.

E. T. Paul, Columbus, O., has installed a new vulcanizing outfit at 122 Parsons avenue.

W. F. Smith, Cleburne, Tex., has purchased an interest in the Corson garage, at the corner of Mill and James streets. The equipment will be improved and the stock enlarged.

The Harrisburg Auto Top Tire Repair Company, Harrisburg, Penn., is erecting a fireproof building. It will be modern throughout.

Benson & Shuhart, Kenmare, N. D., has installed motors and other machinery in its garage and is now prepared to handle repairs of all kinds.

John T. Locke, Lowell, Mass., has taken charge of the Jean garage, at 31 Shattuck street.

C. Hoskins, Edwardsville, Ill., has opened a welding shop at 207 North Main street. He will overhaul and repair automobiles.

Whitford & Barden, Beloit, Wis., is the name under which the business of the former Reaf & Johnson garage on Fourth street will be conducted. The new owners are Frank Barden and George Whitford.

The Thomas Auto Company, Little Rock, Ark., has installed a complete new electric department for charging electric cars and repairing storage batteries. The company handles the Cadillac cars.

Gragg & Rardin, Excelsior Springs, Mo., have reopened the East Broadway garage and will specialize in all kinds of automobile repair work, as well as conduct an automobile livery.

The Sea Street Garage, Lynn, Mass., carries a full stock of accessories and parts for general repairs.

The Auto Sales Company, Jersey City, N. J., dealer in rebuilt cars, will open for business at Newar avenue and Coles street.

Kelly & Clement, Algona, Ia., automobile dealer, has dissolved partnership. Mr. Kelly will conduct the business alone in the future.

E. B. Ottestead, Phoenix, Ariz., has become sole owner of the garage conducted by Ottestead & Wild, Mr. Wild having withdrawn from the business.

The Miller Rubber Company, Buffalo, N. Y., has opened an attractive salesroom at 1060 Main street, with R. J. Strong in charge.

C. E. Freeburn, Dayton, Ia., has purchased the Shostrom and Johnson properties on Main street, the buildings on which will be moved in order to permit the erection of a brick garage.

The Denison Automobile Company, Denison, Ia., has leased the second floor of the Saggau building, where its garage is located. The company will install an elevator so that cars can be taken from the garage to the repair shop, which will occupy the second floor.

P. J. Helerts & Son, St. James, Minn., is now sole owner of the Pioneer garage. The new management has

placed a number of experienced repair men in the machine shop.

J. J. Insley, Crawfordsville, Ind., has decided to remodel his livery stable into a modern garage. His livery stock was sold at auction and reconstruction of the building has begun.

The Seattle Automobile Dealers' Association, Seattle, Wash., recently organized, has elected the following officers: President, George W. Miller; secretary, A. S. Eldredge; treasurer, L. G. Nicolai.

The Phoenix Motor Car Company, Phoenix, Ky., has purchased the property at 166-70 East Main street, the buildings on which will be razed to make way for a modern garage. The price of the property is said to have been \$35,000.

Stanley D. Hall, Carthage, N. Y., has leased the Elmhurst garage and will operate it. He will also conduct an up-to-date repair shop. Oakland and Overland cars are handled.

Hess & Mitchell, Buffalo, N. Y., pioneer in the rubber business, has taken over the Goodyear service station at 1015 Main street. The new owner will handle both pneumatic and solid tires, operate a vulcanizing plant and care for automobile tires in general.

Edward Young, Joliet, Ill., has taken the agency for portable garages. He is the first dealer to take an agency of this kind in that city. A sample of the all-steel portable buildings offered by the agent has been erected for display near the E. J. & E. freight house on Cass street.

The A. Elliott Ranney Company, New York City, distributor of the Hudson cars, has leased the entire sixth floor of the building at the northeast corner of Broadway and 64th street. The company will use it as a service station. The location has 21,000 square feet of floor space. The company's headquarters are at 54th street and Broadway.

The Motor Sales Company, Huntington, W. Va., will remove from its present quarters to 1022 Fourth avenue. E. V. Carter is general manager.

The Benz Automobile Sales Corporation, New York City, will move to 1700 Broadway.

The Monroe Motor Car Company, Buffalo, N. Y., has taken larger quarters at Main and North streets. The building is modern throughout.

The General Auto Supply Company, Reading, Penn., is now located in its new and spacious quarters at 20 North Fifth street.

The Buffalo & Interurban Motor Delivery Company, Inc., Niagara Falls, N. Y., will remove to larger quarters at 508 Elderfield-Hartshorn building.

A. M. Signor, Scranton, Penn., has moved his garage from 329 Adams avenue to 515 Mulberry street, where he is better equipped to serve his patrons.

The Wheelock-Jeffery Company, Boston, Mass., New England distributor for the Oldsmobile cars, is located in its new headquarters at 916 Commonwealth avenue. The showrooms are spacious and elaborately finished.

The Cole Motor Sales Company, Pittsburg, Penn., has moved into the salesrooms at the corner of Craig street and Baum boulevard, formerly occupied by the Lozier company. C. C. Laughner is in charge.

The Ozark Motor Car Company, Springfield, Mo., is to occupy the building at 208 South Jefferson street. It is to be remodelled and will cost \$10,000. This building has been occupied by the Atkinson Motor Car Company.

The Nettleton-Crittenden Company, Boston, Mass., is now located at 1110 Boylston street. The concern is agent for Chandler and Paige cars.

Fred H. Goss, representing the Lyons-Atlas Company, Indianapolis, Ind., has taken a lease of one of the stores in the Motor Mart, Park square, Boston, Mass.

WITH THE MANUFACTURERS.

The Swinchart Tire & Rubber Company, Akron, O., makes a variety of tires for truck use. A special cellular tire for electric trucks is stated to be extremely economical of current consumption, as the flow or

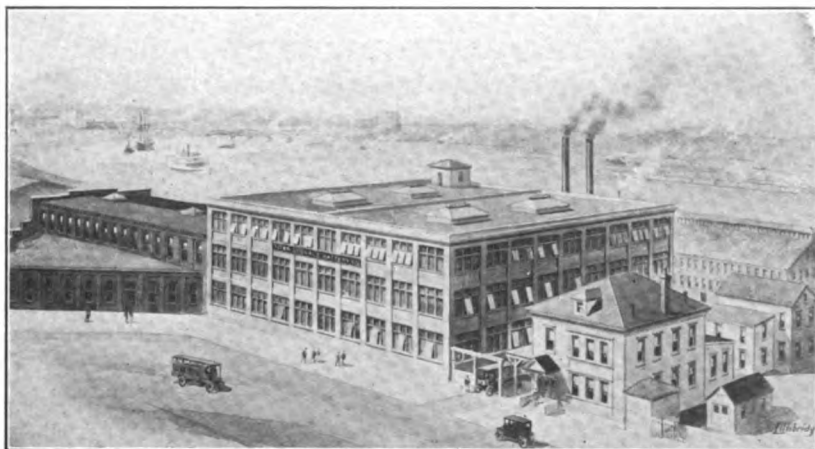
"bunching" of the rubber is absorbed by the cells. Additional claims are that this tire transmits absolute traction; that it will not skid on wet or slippery pavements, and that the additional resiliency prolongs the life of both batteries and mechanism.

The National Rubber Filler Company, Midlothian, Tex., manufactures a rubber tire filler designed to take the place of the inner tube and air, which, the company states, ends all tire trouble. The company claims that it is made on the correct principle and out of the proper material to give service and satisfaction, high grade rubber cut in small pieces and vulcanized together being the medium employed.

The Leather Tire Goods Company, Niagara Falls, Ont., produces a new type of tire chain which differs from ordinary chains in having cross members made of heavy sheet metal pieces. These are formed so as to present the smooth, rounded side of the metal to the tire and the edges towards the road, and it is held that the best possible grip is obtained on the road and that there is a minimum amount of wear on the tire. They are known as the Kant Skid chains.

The Power Efficiency Company, Trenton, N. J., announces that it is entering the manufacturing field. The company will make automobile accessories, and the first of these that will be placed on the market will be a double spark plug. H. T. Caultet is president and E. Furman Hooper is secretary and treasurer. M. T. Minogue is general manager.

The Titan Storage Battery Company, formerly the



General View of the New Plant of the Titan Storage Company, Recently Opened at Chapel Street and Lister Avenue, Newark, N. J.

Baltimore Electric Storage Battery Company, has taken possession of its new factory at Chapel street and Lister avenue, Newark, N. J., an illustration of which is shown herewith.

The Allen Motor Company, Fostoria, O., recently announced that the company's plant will be enlarged during the coming season.

The Saginaw Motor Car Company, Saginaw, Mich., which was recently organized with a capital stock of \$150,000, will manufacture the Saginaw speedster. The new firm is composed of A. R. Thomas and W. L. Walls. The company has practically acquired the property of the Brooks Motor Wagon Company, which is well equipped for manufacturing purposes.

The Aetna Motor Truck Company, Detroit, has secured a factory at the corner of Richmond avenue and East Grand boulevard. The company plans to build, during the first year, 200 trucks of two tons capacity. The officers of the newly formed company are: President and general manager, J. George Wagner; vice president, Ernest E. Kinney; secretary, William A. Eldred; treasurer, John J. Wilson; director, George Humbert.

A. O. Dunk, president of the Puritan Machine Company, Detroit, has purchased the assets of the F. A. L. Auto Company, Chicago. This purchase includes all the patterns, tools, service parts and other property formerly owned by the latter concern, and the entire stock has been moved to Detroit. The Puritan Machine Company is now supplying parts to over 56,000 private owners whose cars were made by firms now out of business.

RECENT PATENTS.

Extra-Tire Lock, John U. Barr, New York City; No. 1,097,608. Filed March 15, 1912.

Driving Axle, Thomas J. Lindsay, Indianapolis, Ind., assignor to Lindsay Auto Parts Company; No. 1,097,653. Filed Aug. 7, 1911.

Dust Subduer for Motor Vehicles, Benno Samuel, Brunswick, Germany; No. 1,097,674. Filed Feb. 26, 1914.

Resilient Tire, Harry J. Sherrill, Salida, Col.; No. 1,097,682. Filed Aug. 19, 1912.

Rear Signal, Cyrus S. Vaughn, New Rochelle, N. Y.; No. 1,097,689. Filed May 23, 1913.

Carburetor, Robert Wellesley, Anthony Brewer and George Herbert Jones, London, England; No. 1,097,787. Filed Dec. 16, 1912.

Driving and Steering Mechanism, Magnodelix Leonard, Montreal, Que.; No. 1,097,807. Filed March 15, 1913.

Puncture Proof Inner Lining for Tires, William A. Ray, Jackson, O.; No. 1,097,820. Filed May 27, 1912.

Resilient Tire Filler, Claude S. Staten, Dallas, Tex.; No. 1,097,824. Filed July 29, 1912.

Resilient Wheel, Clarence Odum Vantrease, Nashville, Tenn.; No. 1,097,829. Filed Aug. 13, 1913.

Valve Truening Device, George G. Bouthinon, Hempstead, N. Y., assignor to G. B. Garage Company; No. 1,097,841. Filed Oct. 29, 1912.

Differential Transmission Mechanism, Frank Brown, Lexington, Va.; No. 1,097,843. Filed July 12, 1912.

Axle, Hiram P. Maxim, Hartford, Conn., assignor to Waverley Company, Indianapolis, Ind.; No. 1,097,866. Filed Feb. 27, 1908.

Mechanical Starter, Bernhard Volkmar, New York City, assignor to Volkmar Auto Starter Company; No. 1,097,898. Filed Jan. 12, 1911.

Motor, Allan D. Shaw, Sayanna, Ill.; No. 1,097,947. Filed Jan. 2, 1913.

Fuel Tank, Elbert M. Stever, Branchport, N. Y.; No. 1,097,950. Filed Dec. 3, 1913.

Motor, Jared V. Brown, Jr., Waxahachie, Tex.; No. 1,098,012. Filed Aug. 8, 1913.

Demountable Rim, Roscoe C. Knowles, Empire, Ala.; No. 1,098,040. Filed Aug. 7, 1913.

Air Starter, Don D. Miles, Jr., San Francisco, Cal., assignor to Benjamin Goodwin; No. 1,098,046. Filed Jan. 20, 1912.

Spark Plug, Richard Brown, Belvidere, Ill., assignor of one-half to Willis S. Brown; No. 1,098,093. Filed Nov. 4, 1911.

Universal Joint, Eugene P. Edwards, Plainfield, N. J., assignor of one-half to A. S. Giles; No. 1,098,101. Filed Oct. 29, 1912.

Spare Tire Holder, Alfred Freschl, Detroit, Mich.; No. 1,098,103. Filed Oct. 15, 1913.

Piston Ring, Harry Magee, Detroit, Mich.; No. 1,098,121. Filed Dec. 11, 1913.

Tire Inflating Apparatus, Frederick A. Ruff, Newark, N. J.; No. 1,098,173. Filed Aug. 26, 1912.

Tire, Ira C. Terry, Monroe, La.; No. 1,098,191. Filed July 10, 1912.

Spark Plug with Priming Device, Ira V. Beam, Elmira, N. Y., assignor of one-half to Nicholas D. Doxey; No. 1,098,214. Filed Dec. 12, 1912.

Magneto, William Casey and Isaac Lessen, Kingston, Ont.; No. 1,098,226. Filed Feb. 15, 1913.

Shock Absorber, Jeremiah C. Lautenbacher and Albert Geary, Schuylkill Haven, Penn.; No. 1,098,271. Filed Dec. 3, 1913.

Tilting Steering Wheel, Franklin C. Prindle, Washington, D. C.; No. 1,098,301. Filed May 19, 1913.

Incandescent Electric Headlight, Charles W. Dake, Chicago, Ill., assignor to Pyle-National Electric Headlight Company; No. 1,098,317. Filed June 17, 1912.

Starting Gearing, Percy C. Day, Milwaukee, Wis.; No. 1,098,344. Filed Oct. 22, 1912.

Speed Indicator for Passing Vehicles, Roy M. Dean, Chicago, Ill.; No. 1,098,358. Filed Nov. 18, 1909.

Spring Tire, Harry S. Gover, Bel Air, Md.; No. 1,098,375. Filed Dec. 13, 1914.

Buffer for Door, Joseph F. O'Brien, New York City; No. 1,098,393. Filed May 29, 1912.

Air Starting Means, Alfred Arnold Remington and Arthur John Rowledge, Birmingham, England, assignor to Wolseley Tool & Motor Car Company, Ltd.; No. 1,098,406. Filed March 18, 1913.

Valve Mechanism for Motors, Augustus F. Schmidt, Pittsburgh, Penn.; No. 1,098,411. Filed Oct. 10, 1912.

Differential Mechanism, Harry E. Bayly, Indianap-

olis, Ind.; No. 1,098,422. Filed May 12, 1913.

Magneto-Electric Generator, Richard H. Cunningham, New York City, assignor to Splittdorf Electrical Company, Newark, N. J.; No. 1,098,431. Filed Oct. 8, 1912.

Locking Device for Steering Wheel, Joseph E. Gibbons, Washington, D. C.; No. 1,098,435. Filed Nov. 24, 1913.

Nut Lock, Thurston Matheny, The Plains, O.; No. 1,098,454. Filed May 12, 1913; renewed April 17, 1914.

Motor, George McDowell, New York City; No. 1,098,455. Filed Aug. 17, 1912.

Anti-Skidding Device for Wheels, Martin Mossberg, Minneapolis, Minn.; No. 1,098,457. Filed Oct. 27, 1913.

Safety Engine Starter, William R. Clark, Muncie, Ind., assignor to Clark Crank Company, Indianapolis, Ind.; No. 1,098,480. Filed May 13, 1912.

Tire Tool, John W. Dyar, Detroit, Mich.; No. 1,098,488. Filed Aug. 6, 1913.

Motor, Herman W. F. Niekrantz, Toledo, O.; No. 1,098,522. Filed Aug. 11, 1913.

Motor Sled, John Francis Oakes, Copos, Minn.; No. 1,098,523. Filed June 10, 1913.

Motor, Joseph A. Williams, Cleveland, O., assignor to K-W Ignition Company; No. 1,098,539. Filed Dec. 19, 1910.

Cranking Device, Selby L. Williams, Richmond, Ind., assignor of one-half to Abiathar L. Way; No. 1,098,541. Filed Sept. 22, 1913.

COMING EVENTS.

June.

June 10-11—Isle of Man road race.

June 12-13—Chicago-Peoria annual reliability run.

June 15—Savannah Automobile Club run, Savannah, Ga.

June 17-18—Hill climb, Uniontown, Penn.

June 19—Track meet, Boston, Mass.

June 23-26—S. A. E. midsummer meeting, Cape May, N. J.

June 24-26—Meeting National Gas Engine Association, Chicago, Ill.

June 25—Track meet, Portland, Ore.

June 27—Race meet, Brooklands track, Weybridge, Eng-

land.

June 27-July 4—American Automobile Association's touring week.

June 30—Track races, Sioux City, Ia.

July.

July 1-3—Non-stop run, Chicago-Boston, for Glidden trophy.

July 2—Targa-Florio cup road race, Mandonic circuit, Italy.

July 3-4—Mid-summer meeting, American Automobile Association, Bretton Woods, N. H.

July 3-4—Road races, Tacoma, Wash.

July 4—Track races, Providence, R. I.

July 4—300-mile race, Sioux City, Ia.

July 4—Grand Prix, Lyons, France.

July 17-18—Speedway meet, Seattle, Wash.

July 25-26—Grand Prix, Belgium.

August.

Aug. 21-22—Road races, Elgin, Ill.

Aug. 23—Coupe de L'Auto race, Auvergne, France.

Aug. 27—Race meet, Brooklands track, Weybridge, Eng-

land.

September.

Sept. 5—Track races, Milwaukee, Wis.

Sept. 7—Track races, Providence, R. I.

Sept. 9—Speedway races, Pomona, Cal.

Sept. 9—Road races, Corona, Cal.

Sept. 9—Grand Prix, Italy.

Sept. 14—Track meet, Milwaukee, Wis.

Sept. 26—Race meet, Brooklands track, Weybridge, Eng-

land.

Sept. 26-Oct. 6—Show, Berlin, Germany.

October.

Oct. 1—Kerosene motor competition, Paris, France.

Oct. 2-3—Track meet, Oklahoma City, Okla.

Oct. 2-3—Track meet, Trenton, N. J.

Oct. 9—Speedway races, Chicago, Ill.

Oct. 9-Nov. 2—European trip, Society of Automobile

Engineers.

Oct. 16-26—Automobile Salon, Paris.

Oct. 17-24—Show, Pittsburg, Penn.

Oct. 19-26—American road congress, Atlanta, Ga.

November.

Nov. 6-16—Olympia show, London.

Nov. 8-11—Track meet, Shreveport, La.

HELP POLICE DEPARTMENT.**Indianapolis Car Testers Organize as Special Force for Speedway Week.**

Indiana automobile manufacturers organized their test car drivers into a vigilance committee to protect visiting motorists from a gang of automobile thieves, which they had reason to believe had selected that city as a profitable field, during speedway week. The movement started as a result of the loss of a brand new touring car loaned V. T. Cleesrath of the Bosch Magneto Company by Harry C. Stutz of the Stutz Motor Car Com-

pany, which was driven away from in front of the Claypool hotel during the busiest hours of the day shortly before the date of the 500-mile race.

In view of the fact that thousands of motorists were in the city throughout the week, and that many people are careless in leaving their machines standing alone for a long time, it was suspected that the thieves had decided they would be able to reap a large harvest. Accordingly, Stutz, National and Cole testers, as well as those of other concerns in that city, covered practically all of the streets in the Hoosier capital, and were of great assistance to the police department.

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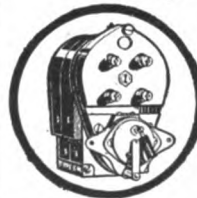
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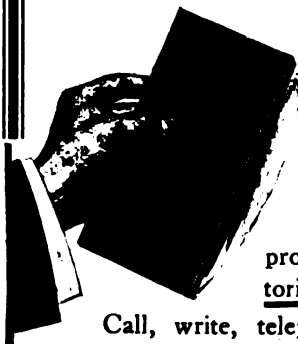
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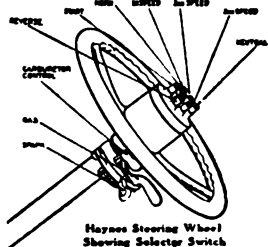
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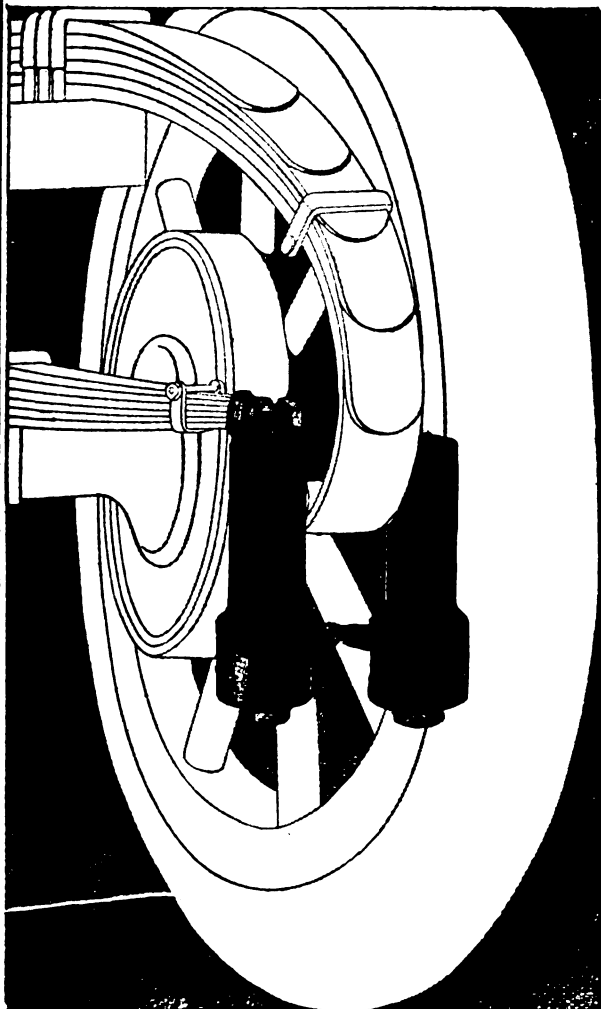
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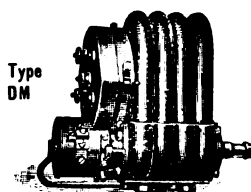
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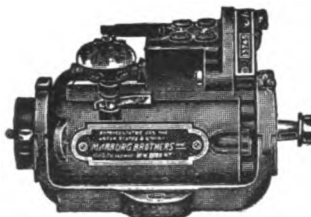
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R. I. V. Co., 1771 Broadway, New York. (R. I. V.)

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Cole Motor Car Co., Indianapolis, Ind. (Cole.)

Empire Automobile Co., Indianapolis, Ind. (Empire, Little Aristocrat.)

Haynes Automobile Co., 166 Main St., Kokomo, Ind. (Haynes.)

Knox Motors Co., Springfield, Mass. (Knox.)

Lexington-Howard Co., Connersville, Ind. (Lexington and Howard.)

Maxwell Motor Co., Inc., Detroit. (Maxwell.)

Metz Company, Waltham, Mass. (Metz.)

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National Motor Vehicle Co., 1033 22nd St., Indianapolis (National.)

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 Premier Motor Mfg. Co., Indianapolis, Ind. (Premier.)
 Reo Motor Car Co., Lansing, Mich. (Reo.)
 Salvador Motor Co., Farragut Bldg., Massachusetts Ave., Boston. (Salvador.)
 Studebaker Corp., Detroit. (Studebaker.)
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 Willys-Overland Co., Toledo, O. (Overland.)

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 Cartercar Co., Pontiac, Mich. (Cartercar.)
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 Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)
 Reo Motor Car Co., Lansing, Mich. (Reo.)
 Studebaker Corp., Detroit. (Studebaker.)
 Velle Motor Vehicle Co., Moline, Ill. (Velle.)
 Willys-Overland Co., Toledo, O. (Willys Utility and Garford.)

CARS—ELECTRIC COMMERCIAL.

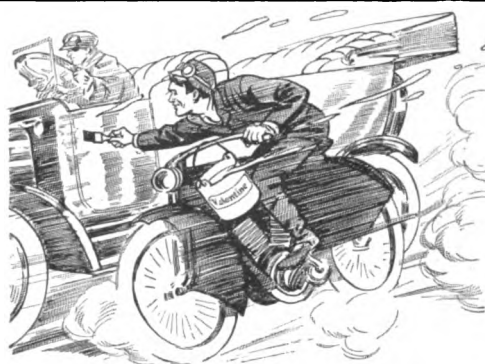
Baker Motor Vehicle Co., Cleveland. (Baker.)
 Couple-Gear Freight-Wheel Co., 575 Buchanan St., Grand Rapids, Mich. (Couple-Gear.)
 Branches: 30th floor, Singer Bldg., New York; 178 Devonshire St., Boston.
 General Motors Truck Co., 26 Cadillac Ave., Pontiac, Mich. (GMC.)
 Branches: See Cars—Gasoline Commercial.
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(Continued on Next Page.)

(BUYERS' GUIDE—Continued.)

HEADLIGHTS, TURNING.

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Haws, Geo. A., 148 Front St., New York. (Panhard.)
Branch: 899 Boylston St., Boston.

Indian Refining Co., 17 Battery Place, New York City.
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Miller, Chas. E., 97-103 Reade St., New York. (Pan-
American.)

Branches: See Accessory Manufacturers.
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New York. (MoToRol, Non-Fluid, Kejex.)

Northwestern Chemical Co., Marietta, O. (Gear-Silence.)

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Bldg., Chicago; Ford Bldg., Detroit; Indiana Pythian
Bldg., Indianapolis.

Valvoline Oil Co., 27 State St., Boston. (Valvoline.)

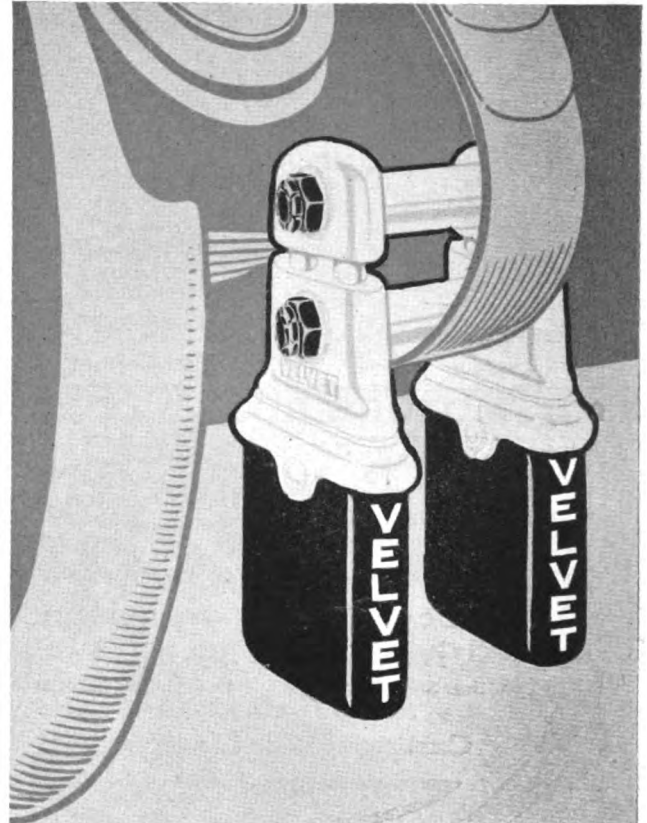
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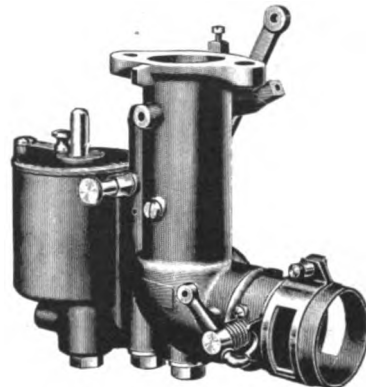
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the birthplace of motor vehicles produced the Zenith Carburetor—for six years the unchanging standard of the best known makes abroad. For speed, for pleasure, for profit—in every field of motor activity—this scientific device is used by 150 famous motor cars of Europe.



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Why You Should Know About It Baverly's principle of "the compound nozzle" made possible the Zenith. It is called the greatest step forward in carburetion since Kreb's early device. You should know more about the Zenith—what it will do for your product—what it will mean to your customers. A request will bring you facts. A thorough test will prove them.

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WHY USE INFERIOR PLUG WHEN CENTERFIRE

can be bought at the same price? They overcome all Engine troubles, fire where others fail and Add Power to engine. Any length point desired made to order. Try them and you will use them—always. Make a trial and save money. \$1.00 each, 6 for \$5.00.

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Agents wanted and special prices to dealers.

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THE STANDARDIZED CAR



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A Cole franchise is a valuable asset to any dealer. Find out about it.

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Harding Specialties Co., Inc., 755 Boylston St., Boston.
(Boston.)

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Combination Tail Light Co., 954 Tremont St., Boston.
(Universal Electric.)

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(Prest-O-Lite.)
Branches: See Cylinder Cleaning Compound.

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Prest-O-Lite Company, 226 Speedway, Indianapolis.
(Baby Tire Filler, The Emancipator.)
Branches: See Cylinder Cleaning Compound.

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Dealers: Send For Big Catalogue
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WE ELIMINATE

Waste
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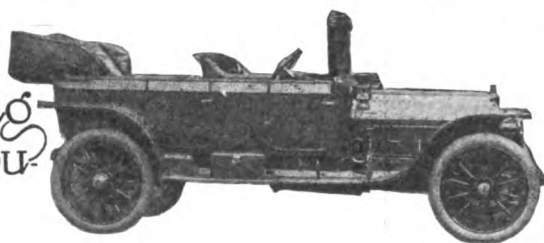
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Cutter, George A., Taunton, Mass.

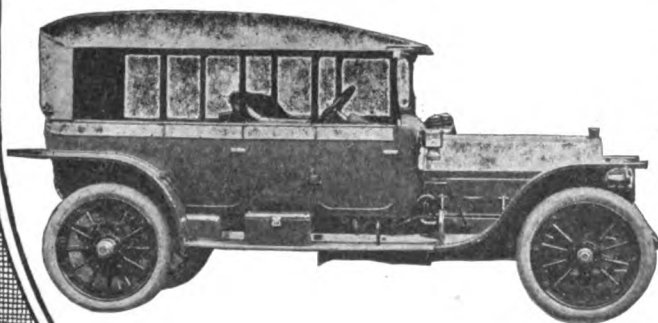
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The comfort of every car body combined. An instantaneously convertible equipment that affords a touring body or a limousine whenever desired.



Changes can be made on the road as readily as in the garage. No matter what the occasion or requirement, your car with the

SPRINGFIELD CONVERTIBLE BODY is always ready and always has



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Can be raised or lowered

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It depends on the piston rings. Full power can only follow perfect compression—and such compression requires the use of



The Name
LEAK-PROOF
Stamped On
Every Ring

Piston Rings

MADE BY McQUAY-NORRIS MFG. CO.

The only piston ring that is effectively gas-and-oil-proof because of its "sealed openings and the equal and sustained bearing it obtains on the cylinder.

The superior quality of the metal used in the **LEAK-PROOF** Ring—the strength and simplicity of its design—the careful testing it undergoes for flaws—the accuracy of its finish—these are the reasons why it is the most durable, economical and efficient piston ring. Made in all sizes—easily adjusted.

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It tells all about piston rings and why you should equip your engine with the **LEAK-PROOF**. How it will pay you in fuel economy and prolonged motor life. Write for it.

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*In Use on
Over 200,000 Automobiles
and Motor Boats*

*Sold by all up-to-date
dealers, garages, repair shops
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Look for the name **LEAK-PROOF** stamped on the Ring

VOL. XXXVII.

NO. 10.

AUTOMOBILE JOURNAL

\$1.00 the year
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PAWTUCKET R.I.

June 25, 1914

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It is one of the most important things to know because an oil which is suited to ~~the~~ ^{your} system may not be the best for another.

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Veedol is a highly refined oil from Pennsylvania paraffine petroleum—the result of over 30 years experience with lubricating oils. Get a copy of the chart from your nearest dealer or write us for one. The information it will give you may double the life of your car.

Platt & Washburn Refining Company

Established 1878 Incorporated 1885

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TO DEALERS: We want responsible representatives everywhere for Veedol. If there is no AGENT near you, write at once for terms and full information about the intensive co-operative selling plan by which we are introducing Veedol to car owners in your neighborhood.

The 9 lubricating systems

1. Full Splash
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7. Force Feed
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9. Knight Slide Valve Motor





THIS name stands for the finest brake lining possible to make. It represents a high degree of quality and wearing power which no competitive product has ever been able to attain. We could cheapen



in many ways and sell it at a lower price. But that we will never do. The integrity of the Raybestos name and the safety of the Raybestos user far outweigh all other considerations.

Whenever you see the name Raybestos, you will know it rep-

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In these days of frenzied competition in the brake lining field, we believe this declaration of principles is needed. And we back it up with a definite one year guarantee that no other maker duplicates.

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Hartford

AUTO COMFORT

EQUIPMENT

THE HOME OF HARTFORD AUTO COMFORT EQUIPMENT

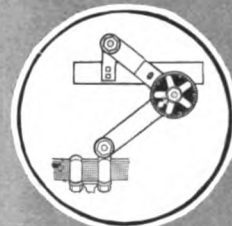
Automobile accessories of admitted excellence which contribute to the maximum enjoyment of motoring—each a quality product and a proven factor in promoting comfort, economy and safety.

Truffault-Hartford

SHOCK ABSORBER

The Truffault-Hartford Shock Absorber is the inevitable choice of motorists who give the three-fold problem of greater comfort, safety and economy, the study it deserves. For ten years this standard device has "made good" by making "Every Road a Boulevard." Today a quarter-million motorists enjoy constant comfort through its use. Twenty-five leading makers recognize Truffault-Hartford as "The Pioneer and the Best" by adopting it. Inventive ingenuity earned for the Truffault-Hartford the exclusive right to use the principle of Rotary Friction. Science and results prove that this is the only principle that actually absorbs shocks and vibration. Absolute comfort, lowered upkeep cost and greater safety are logical results.

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Hartford Bumper

The strongest motor car bumper in the world—no other statement does justice to the Hartford Bumper. A veritable breastwork between car and passengers and the dangers of collision. The four-leaf friction-springs—an exclusive feature—completely absorb the shock and jar.

Saves repair bills by preventing smashed headlights, damaged radiators, twisted mud guards, broken springs, etc. Beautifies the smartest car. Made of staunch metal tubing reinforced with a solidified cement-like composition, combining maximum strength with minimum weight. Attached to any car in 15 minutes. Four sizes—\$15, \$12.50 and \$10. Special Ford Type, \$10.



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Hartford Cushion Springs insure the degree of flexibility which most automobile springs lack. These comfort-conserving devices increase flexibility and provide for easy riding on average roads just as effectively as Truffault-Hartford Shock Absorbers control excessive flexibility and provide easy riding on rough roads. In combination, these devices offer super-comfort on all roads under all conditions. Hartford Cushion Springs eliminate the continual annoyance and discomfort of travel over small ruts and bumps, car tracks, cross-walks, cobblestones, etc. They are compact and unobtrusive, of the finest material and workmanship, and easily applied to any car.

Four Models, \$35, \$30, \$25. Special Ford Type \$16.



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A bright spot in many a wayside stop for repairs is the easy, rapid, efficient work of the Hartford Auto Jack. This handsome tool lifts a heavy car with wonderful ease and quickness. No muscle needed, no back-breaking, perspiring labor—just a simple wrist-movement and up goes the car; a turn of the reversing lever and down it comes smoothly, without jerk. It's all in the gears, ingeniously devised to multiply energy. Made for the motorist willing to pay a little more for something very much better.

Price, \$6.50.

Guarantee: "Money back if not satisfactory." Under this broad policy all Hartford products are sold. Any article of our manufacture not proving satisfactory after 30 days' trial from date of purchase, can be returned and the purchase price will be refunded.

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Manufacturers of Hartford Electric Starting and Lighting System
Branches and distributors in all principal cities of United States and Canada Dealers everywhere

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Last a Lifetime, and are 30% Stronger
Than Any Other.**

**"COES" on any Wrench Means Quality,
Best Material and Finest Workmanship.
An Inspected and Tested Wrench. The
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and Finish.**

**The "COES" Automobile Model are for Motorists
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Tool Kit or Repairshop is Complete Without One.**

**Ease of Handling Without Fear of Slipping or Bruis-
ing. Perfect Balance and Certain Grip has made the
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the World.**

COES WRENCH CO.

WORCESTER MASS.

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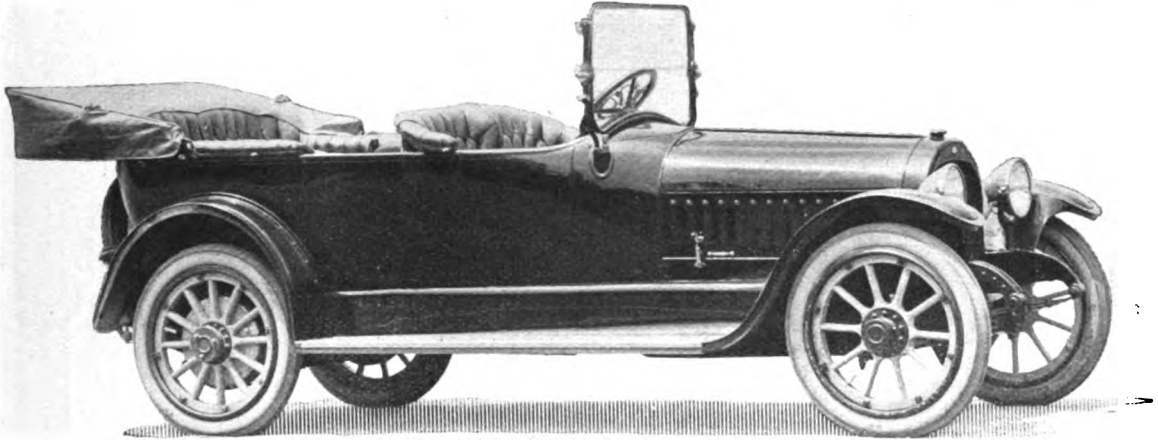
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THE EASIEST RIDING CAR IN THE WORLD

MARMON

The New Marmon "Forty One"—132" Wheelbase—\$3250



An Extraordinary Car

Backed, not merely by what we "claim" for it, but, by *actual proof* of value, comes this new Marmon "Forty One".

But again we want to remind you—the Marmon is sold—not merely on what the manufacturer or dealer "says", but on the *actual proof* of the car itself.

The new Marmon "Forty One" is now ready to bring you its own proof of value. *Ask for it.*

Three Great Ideas

In this limited space, we want to give you just three reasons why this new Marmon "41" is a better car to sell or to own than any other automobile offered to the dealer or owner.

1st—"41" Appearance: Note the sloping hood with its rounded radiator; the harmonious lines of the perfectly formed body; the commodious rear seats; clean crowned fenders. *No other American car* so perfectly blends the final word of the coach-maker's art with the highest development of automobile engineering and manufacture.

2nd—"41" Equipment: The only car bearing complete BOSCH equipment for lighting, starting and ignition. These world-famous makers have designed and proved this installation solely for the new Marmon "41." The wonderful, new Bosch lamps with parallel-ray, parabolic reflectors, appear *first* in this combination. The new Bosch water proof spark plugs, switches, bulbs, and every other unit in the system is designed by Bosch engineers to make this *complete* system representative of the acme of automobile electrical equipment. *Every wire* except a single one to the horn, is Bosch equipment and every detail, as well as the complete system, is backed by their *guarantee* and *world-wide service*. This is but one of the many superior equipment features of this extraordinary car. Add to it a perfected one-man top of distinctive design, Silvertown Cord Tires, the *highest priced* and *best tire equipment* which any manufacturer can provide; and you gain another impression of why this car *must* prove its value.

3rd—"41" Construction: The Marmon "41" six-cylinder engine, with the distinctive Marmon continuous circulating oiling system, the Marmon seven-bearing crankshaft and many other developments of design and construction originated and developed on Marmon cars, are already proven to you. If not, it will pay you to investigate. The new Marmon "41" adds to these features an improved Marmon transmission with cross gearshift slide on ball bearings. This and other refinements make it the *most perfect piece of motor car mechanism* ever marketed in America at anywhere near its price.

A Fourth and Greater Idea

It will pay every wise dealer and buyer to know the details of this new Marmon "41".

To the dealer, who is located where Nordyke & Marmon Company is not now represented, this car offers the *profitable* opportunity to form a *permanent* relation with a solid, substantial manufacturer, backed by over 63 years of successful manufacturing experience. It furnishes the further opportunity of *making sales* wherever there is a wise buyer with knowledge of real motor car value and a desire for the *best*. If you are this dealer—get in touch with the Marmon Sales Service Department now and learn what the co-operation of this organization means to you.

To the owner, who has wished and waited for the best of automobile values at a *logical price* and *really knows* how to discriminate, here is the greatest idea in motordom—make us *prove* the value of the Marmon "41."

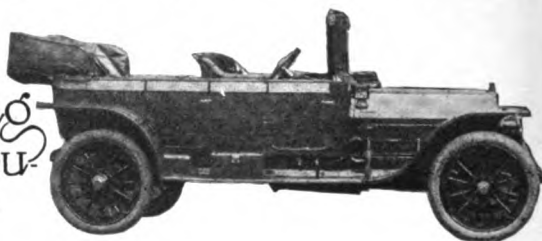
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Indianapolis (Established 1851) Indiana
Marmon "Forty Eight"—145" Wheelbase—\$5000

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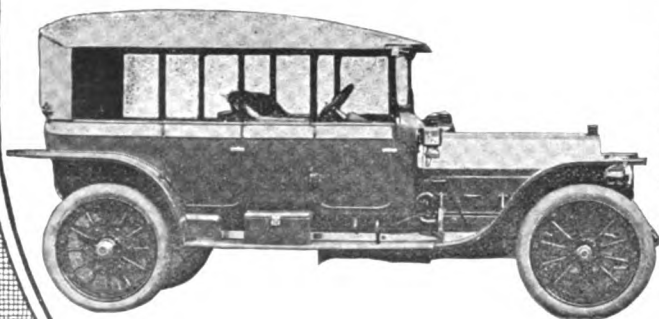
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Changes can be made on the road as readily as in the garage. No matter what the occasion or requirement, your car with the

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Can be raised or lowered

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“Don’t lose any more time or money on this electric system—

The easiest and best way to save yourself further bother and expense—
The only way to get satisfactory and dependable light—

Get Prest-O-Lite”

That’s what the wise repairman says, and—
Every Night Proves It!

Thousands of motorists who have tried out electricity for lighting and are tired of paying for constant repairs and replacements are having these systems torn out of their cars and going back to Prest-O-Lite.

Eliminate the useless complication and troubles of electricity—cut down weight—increase power. For the cost of one repair bill or a battery renewal, you can make the change from electricity to the safe, satisfactory, saving service of Prest-O-Lite.

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The Prest-O-Lite, or any other good automatic gas lighter, offers you every “push-the-button” convenience for lighting, dimming or extinguishing your gas lights. The automatic reducing valve prevents the flame from exceeding the proper height.

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Get the real facts about satisfactory lights today. Wake up to the new meaning of gas lighting with every comfort, convenience and economy. Your address brings it.

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Introducing the New Fore Door Model
Stream Line Body, Plate Glass Rain-Vision Wind Shield
The Ideal Car for Cross Country Driving or City Use

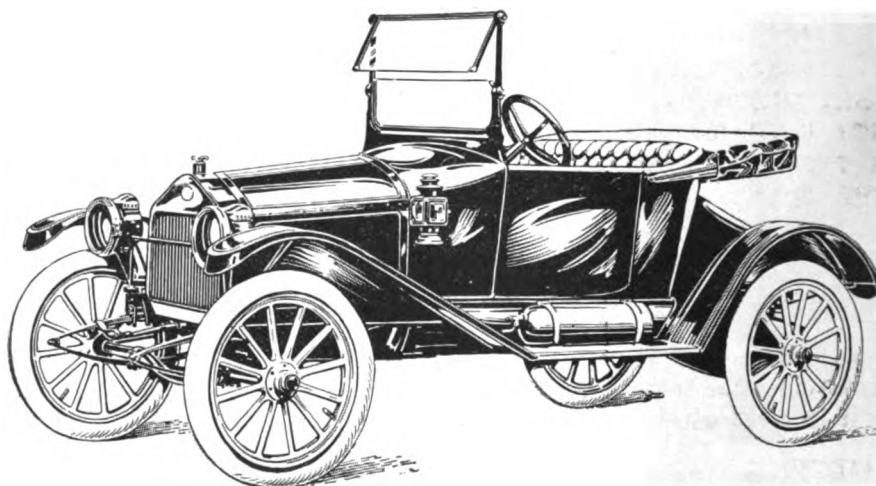
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Big, roomy seats, with thick, tufted upholstery and deep cushions, built for luxurious comfort.
Four-cylinder 22 1-2 H. P. water cooled motor, Bosch high tension magneto, Prest-O-Lite tank, best quality Goodrich clincher tires.

Fore doors of liberal dimensions, 20 inches wide.

Left-hand drive, with center control.

Gearless Transmission—the kind that won the Glidden Tour.



WINNER OF THE GLIDDEN TOUR

The Metz "22", in open competition with cars of all makes and prices, won the last Glidden Tour, from Minneapolis, Minn., to Glacier National Park, Mont., the three METZ cars being the **ONLY** cars that held *perfect scores*, without time extension or additional allowance of any kind, for the entire eight days of the contest. The METZ cars were the lowest priced cars

in the tour, and they were the only cars in it that were equipped with *gearless transmission*.

Mr. Chas. H. Metz has been building cars of this type and developing their perfection, *sixteen years*. As a result, the METZ "22" is today the most practical car on the market, regardless of price, horse power, or any other qualification.

Write for New Catalog "Q"

METZ COMPANY, WALTHAM, MASS.

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WESTERN UNION TELEGRAM

UNIONTOWN, PA. JUNE 18 1914

METZ COMPANY,

WALTHAM, MASS.

IN HILL CLIMBING CONTEST AT UNIONTOWN, PA., METZ WINS EVENT TWO AGAINST FIELD OF THIRTEEN SPECIAL RACING CARS, TIME FOUR MINUTES, THREE-FIFTHS SECONDS. KLINE SECOND, MERCER THIRD, CHANDLER FOURTH. FORD, MAXWELL, BUICK, OVERLAND, HUDSON IN ORDER NAMED. METZ ALSO WINS SECOND IN THE FREE FOR ALL CONTEST, BEATING FIFTEEN OF THE BIG SPECIAL RACING CARS, INCLUDING SIMPLEX, MERCEDES, PACKARD, MERCER, OLDSMOBILE, BUICK, STUTZ, LOZIER, ALL THE WAY FROM TWENTY FIVE SECONDS TO ONE MINUTE AND TWENTY-TWO SECONDS. THIS THREE MILE CLIMB IS DECLARED TO BE THE MOST DIFFICULT IN THE COUNTRY.

CHAS. H. METZ.

LET FACTS MOULD YOUR OPINION

If any further evidence was needed of the superiority of *gearless transmission*, this latest performance of the *gearless* METZ "22" surely supplies it in overwhelming measure. METZ leads the leaders.

The METZ "22" is the most compactly built car in the world, and is extremely economical in operation and upkeep. METZ owners travel 28 to 32 miles on 1 gallon of gasoline, 100 miles on 1 pint of lubricating oil, and 10,000 to 12,000 miles on a single set of tires. It makes 50 miles per hour, and at hill climbing is unsurpassed. Its engine develops more horse power per 100 pounds of car weight than any of the big touring cars, and its gearless transmission does away entirely with gear trouble. It is easy to drive and easy to take care of; and it costs so little to buy it, and so little to run it, that it combines in greatest degree absolute *economy* with absolute *luxury*.

TO DEALERS

The demand for a small car that is reliable in performance and economical in operation, is increasing enormously. The new METZ "22" Fore Door Model meets this demand precisely. We want a representative in every city and town. Be first in your section. Write us for terms and new Catalog "Q."

METZ COMPANY, WALTHAM, MASS.

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FOR SALE—1911 Peerless Touring Body, New Top, Fore Doors. Price reasonable. Inquire D. W. BELLOWS, 85 Park Place, Pawtucket, R. I.

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104 BROAD STREET BOSTON, MASS.

IT'S almost a crime the way most manufacturers deliberately rob Webster, of every choice adjective ever conceived, in a frantic effort to force you to think their car is worth the inflated price asked for it.

You'll do well to skip all flowery and fancy word formations. Stick close to the facts. Get right down to actual specifications. There you find, tabulated, the real worth.

The closer you study and compare specifications the better you realize the advantages and economy of buying an Overland.



\$950 Completely equipped

\$1075 With electric starter and generator

Prices f. o. b. Toledo, Ohio

BRIEF SPECIFICATIONS:

Electric head, side,
tail and dash lights
Storage battery

35-horsepower motor
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High-grade speedometer

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The Willys-Overland Company, Toledo, Ohio

Manufacturers of the famous Overland Delivery Wagons, Gatford and Willys-Utility Trucks. Full information on request.

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PUBLISHER'S AND READER'S PAGE.

The Index of Tours in the Eighth Annual Touring Number of The Automobile Journal, to be published July 10, is so compiled that it is possible for tourists to start from any point and arrive at any given destination in the United States or Canada, utilizing the routings presented. In addition, all the principal vacation spots, night stops and chief centres throughout the country are indexed according to tour, page and map location. The maps are unusually distinct.

Preparing the Car for the tour is a subject in which every motorist is interested. Practical suggestions for inspecting, adjusting and repairing the components of the chassis will be comprehensively dealt with in the July 10 issue. The article will be supplemented with description of time and labor saving tools useful in the overhaul of the car. Many other mechanical articles will be included, making the issue the most complete of its kind ever published. The price will remain the same as usual, 10 cents.

As to Advertisers of practical accessories, supplies and equipment. The Eighth Annual Touring Number of The Automobile Journal, to be published July 10, will reach thousands of prospective purchasers at a time that they are in the market. The edition will be retained and referred to continuously the entire year, according lasting publicity.

The Equipping of the car for the tour requires careful consideration to eliminate excess weight and economize space. This subject will be dealt with by one familiar with touring requirements.

Touring Garments will be described and illustrated in the July 10 issue and the offerings of the designers for the season are such that there is a wide variety of practical models. The article will contain suggestions for the man who desires to be well dressed while on the road, as well as

protected when at work around the car when en route. Latest motoring apparel for women will be discussed and the styles illustrated.

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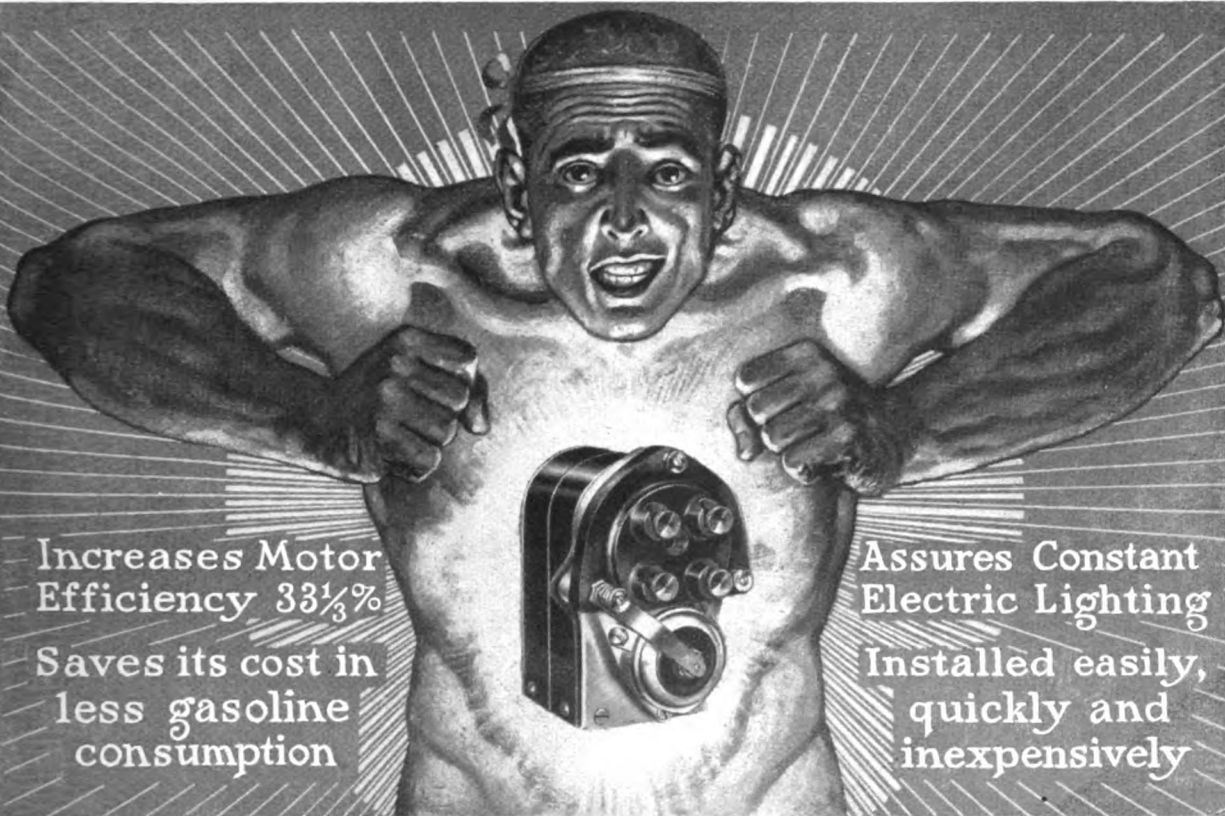
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Increases Motor Efficiency 33 $\frac{1}{3}$ %
Saves its cost in less gasoline consumption

Assures Constant Electric Lighting
Installed easily, quickly and inexpensively

SPLITDORF FORD SPECIAL

WATERPROOF HIGH-TENSION MAGNETOS

that are giving thousands of the popular motors the response and flexibility of the highest-priced automobiles!

Every owner of a Ford automobile owes it to himself to investigate the SPLITDORF high-tension magneto that is revolutionizing the running of thousands of these remarkable cars.

Every refinement has been incorporated in the SPLITDORF instruments to make them as simple, positive and reliable as the demands of the constantly growing thousands necessitate—in a word, they are built for the multitude and carry the SPLITDORF GUARANTEE.

An installation of the thoroughly tested SPLITDORF FORD SPECIAL high-tension magneto—designed and manufactured specially for Ford cars, commercial as well as pleasure—will convince an owner of its absolute merit in getting "the best out of the motor."

With its installation in a few hours by the comparative novice, the expense of vibrators, coils and batteries passes away and A HIGH-TENSION SYSTEM SECURED that gives truly remarkable results.

Write for "Ford Power Possibilities"—a booklet showing how any Ford owner can increase his motor efficiency. It's FREE



The SPLITDORF waterproof instrument is enclosed gear-driven—no chains or open gears

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A VISION
of your car,
disastrously skidding
on the slippery turn ahead—

You have neglected to put on Weed Chains. **You** anxiously view the slippery turn ahead and have **a mental picture of your car skidding into the school children.**

Stop nursing anxiety and coaxing calamity. For Safety's sake—for your own peace of mind fully equip your car today with

Weed Anti-Skid Chains

The Only Real Safeguard Against Skidding

Safety demands that all tires be equipped with Weed Chains. It doesn't require the gift of second sight to see why this is true. **Rubber slips—never grips.** Rubber will agree to anything the road has to offer. It is the weaker element. It slides on wet pavements like a cake of soap rubbed on the moistened hands. Rubber lacks the bite-and-hang-on ability to prevent skidding.

Weed Chains are diamond hard—many times harder than their opposing element the pavement or road. Wheels equipped with Weed Chains automatically lay their own traction surface. They grip without grinding—hold without binding. **No matter how muddy or icy the road,** they hold on like a bull-dog, prevent side-skid and drive-slip.

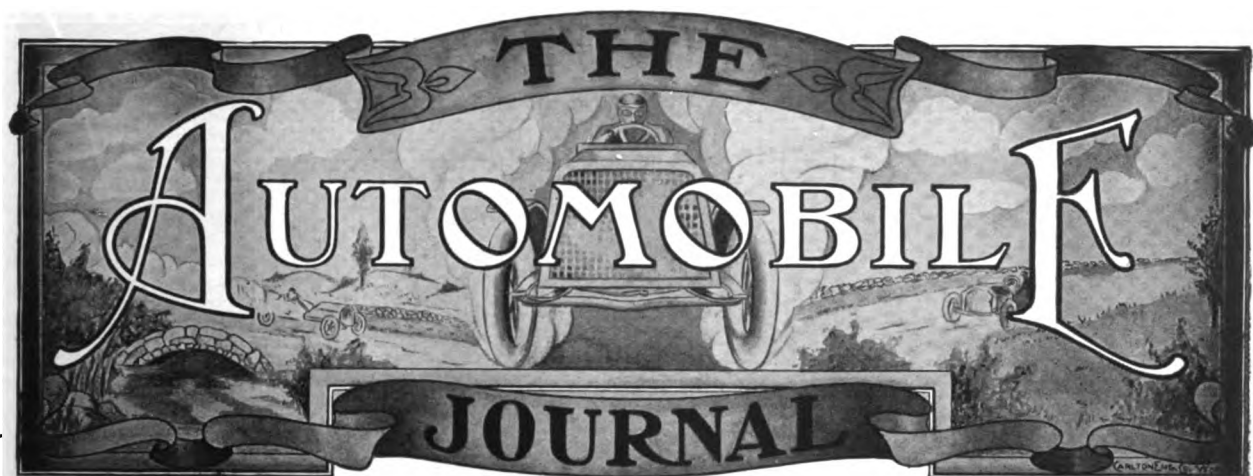
Weed Chains are attached in a moment without any jacks. They do not injure tires. Sold for ALL Tires by Dealers Everywhere

WEED CHAIN TIRE GRIP COMPANY
Bridgeport, - - - Connecticut

Manufactured for Canada by

DOMINION CHAIN COMPANY, Limited—Head Office: Shaughnessy Bldg., Montreal, Can.





VOL. XXXVII, No. 10

JUNE 25, 1914

Price, \$1.00 the Year

TRUCKS GAIN HEADWAY IN MUNICIPAL WORK.

Cities and Towns in Their Various Departments Use Motor Equipment, in Place of the Old-Fashioned Horse Drawn Outfits, with Entire Satisfaction.

SEVERAL years ago, motor apparatus for municipal work of all kinds was considered partly as a luxury and partly as an experiment. It was only recently that the majority of city and town authorities began to recognize that the introduction of automobiles into fire, police, water works, health, school and other departments means a positive increase in municipal operating efficiency, which in turn works an increase of economy in the long run, despite the relatively high initial cost of automobile equipment when com-

pared to the first cost of horse drawn vehicles.

Fire departments were the first municipal organizations to prove this. It soon developed that cities using motor equipment for fire fighting were rapidly cutting down the fire losses suffered by residences and places of business. Progressive fire chiefs were quick in seeing that fire trucks by arriving several minutes earlier at places of conflagrations were often able to quench a fire which would have spread considerably, perhaps once and for all beyond the control of the firemen, had the arrival of horse drawn

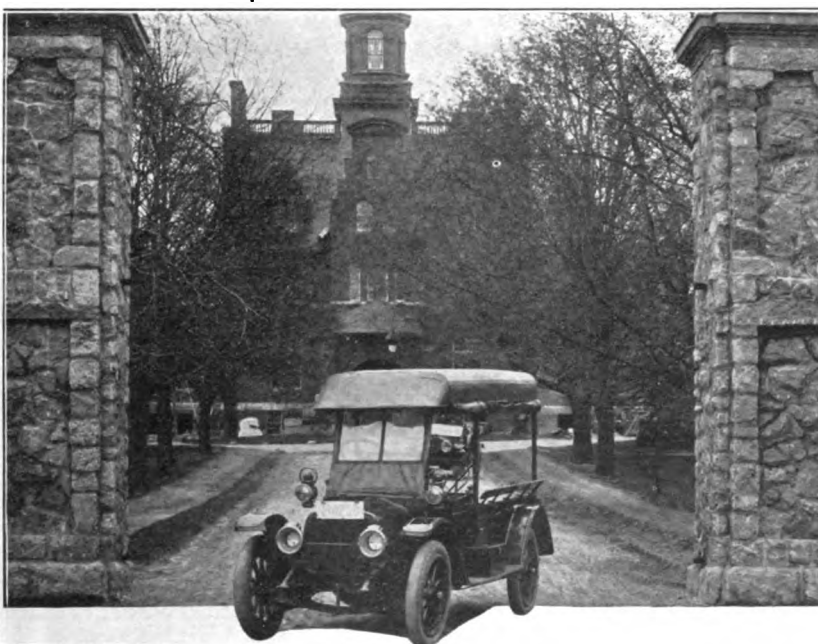


Fig. 1—Motor Truck Transferring Passengers to and from Infirmary at Tewksbury.

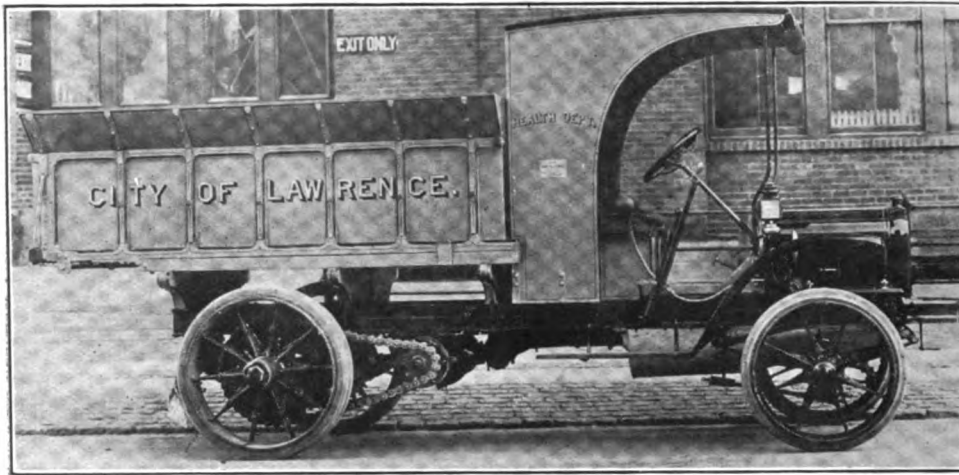


Fig. 2—Three-Ton Truck and Dumping Body Used by Lawrence, Mass., Highway Department.

equipment been awaited. Water works departments soon followed suit by recognizing the merits of emergency outfits. Likewise, automobile ambulances soon demonstrated their superiority over the old-fashioned equipment and today there is hardly a city of any importance in this country where they are not found.

Especially New England has blazed the way and is still doing so. Motor fire fighting apparatus is found in most leading cities and, having been dealt with many times before, no specific instances will be cited.

The Boston water and sewerage board, which maintains the large park system of the Hub, has in its service a truck, Fig. 4, which is designed to transport a number of men and such tools as are needed to make what repairs are required. The truck here shown is a 1500-pound White wagon and since its installation has given utmost satisfaction to the authorities.

An emergency wagon of the Boston water department of the Department of Public Works is shown in Fig. 3; this vehicle has an open body,

people requiring medical attention to places where they can get it is worth a goodly investment. Therefore, the city hospital has installed two 1500-pound White trucks with special bodies so designed and sprung that patients can be very quickly placed into the interior of the wagon and brought to the hospital. This installation is, of course, only one of many in New England.

Boston also operates a school transfer wagon, seen in Figs. 3 and 7. This truck is covered and equipped with side curtains, which may be rolled down on the sides of the body and fastened outside. The design of the body is very similar to that of the water and sewerage works emergency wagon.

Another interesting application of the motor truck in public works is seen in Fig. 1. This 1500-pound wagon is used by the Massachusetts State Infirmary at Tewksbury for the transfer of passengers to and from Lowell, and it has been in this service for the past three years. Besides this automobile, the institution operates a tour-

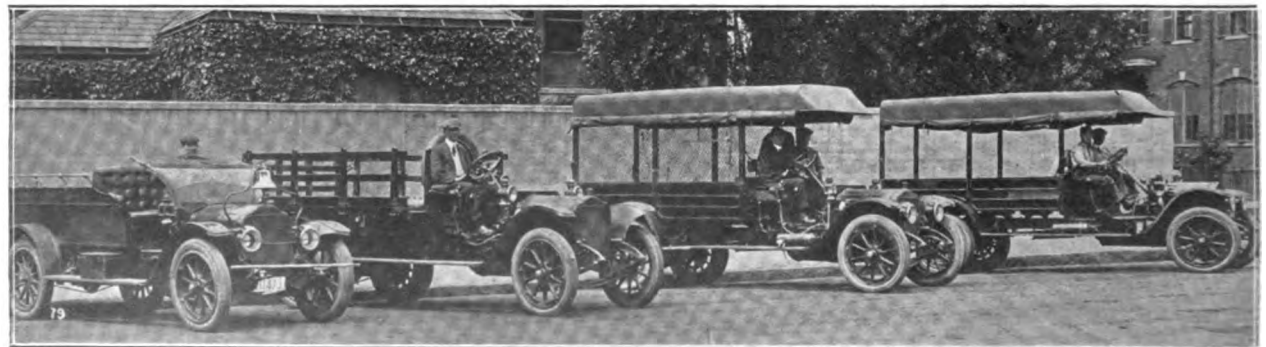


Fig. 3—Four Trucks Used by City of Boston, from Left to Right: Emergency Wagon of Water Department; Public Ground Department's Wagon; School Committee's Transfer Wagon; Park Department's Wagon.

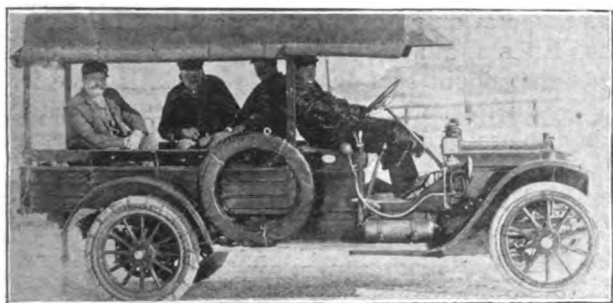


Fig. 4—Emergency Wagon of Metropolitan Water and Sewerage Board, Boston.

ing car and two small cars, which serve for the carrying of food from the general kitchen to the several divisions of the infirmary. This work is done three times a day and keeps the machines going most of the time.

Another special truck in the service of the State of Massachusetts is seen in Fig. 5. This is a 3000-pound chassis, has a low, open body and is used for carrying all sorts of freight, as well as arms and ammunition between the state arsenal at Watertown and the different places where military forces are stationed.

A three-ton truck with dumping body used by the street department of Lawrence, Mass., is illustrated in Fig. 2. It is a White truck. A similar vehicle is in use in New Bedford, Mass.

All the instances quoted above are of such service where speed and reliability, the great virtues of the motor truck, are of importance, but where profit is not looked for nor low cost of operation a determinant quantity. Service is the main thing, even if it is expensive. But there is no lack of examples of truck operation in fields where efficiency must be had at a low price. Following is a short description of a truck, and its work, used by the water department of Lynn, Mass., in extending a supply main to the Ipswich river in the town of Lynnfield. This extension is being built of 30 and 36-inch iron pipe and 7000 tons of pipe will be handled in all. Each pipe section weighs about 2.5 tons.

Fig. 8 illustrates the five-ton truck used for the carrying of the pipe sections from the wharf to the point of in-



Fig. 5—Truck Used by Massachusetts State Arsenal for Various Materials.

stallation. The power needed for loading or unloading the truck is supplied by the motor and transmission through a chain driven pinion mounted above the gearset and connected to a bevel gear on the winch cross shaft, which carries a drum at each end. Above the chassis and winch is a platform with openings in it just above the winch ends and with rolls, preventing the rope from binding when it is taut. Two heavy hooks hold a large single sheave block and two transverse bolsters are in place on the platform beneath the hooks. A cable secured to an eye on the far side of the platform is wound around the pipe and the winch and by applying the power of the engine the pipe is hauled up, one man being sufficient to guide the rope.

The truck carries two pipe sections, making up its carrying capacity of five tons. In addition to this load it draws a trailer, which consists of a pair of large wheels and an arched axle from which the pipe section is suspended. Two ratchet gears and a lever arm which may be lengthened by a long pole serve for raising and lowering the pipe.

The complete train, consisting of truck and trailer, travels at a rate of approximately 4.2 miles an hour. Six-sevenths of the material to

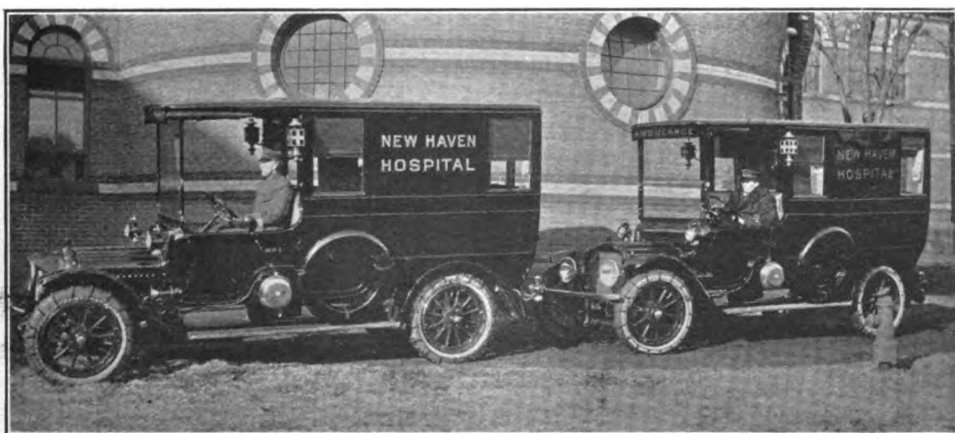


Fig. 6—Two White Trucks Equipped as Ambulances and Used by the New Haven Hospital.

be hauled is 36-inch pipe; hence 2400 sections have to be carried from the landing place to the point of destination. On the average the truck has made six trips a day, thus hauling 18 sections, or 45 tons. About 133 days are required to carry all the 36-inch pipe and 30 days to carry the 30-inch pipe. Double teams of horses could make only two trips a day, and it has been estimated that the saving obtained by using motor trucks for this work amounts to 73 cents a ton, or \$5110 for the complete work. Thus the truck will have more than paid for itself when the job is finished and it will be retained by the City of Lynn for divers municipal service, to be worked at mere operating and maintenance cost.

The City of Lynn now owns and operates also two Federal trucks and two touring cars, all of which are kept in a municipal garage combined with the city's stable.

It goes without saying that there are many other opportunities for the motor truck to be put to use in municipal work, such as sprinkling wagons, garbage carts, etc. Undoubtedly these types will be more generally motorized in the near future, and in less than a decade the horse will probably have been eliminated as a factor in public transportation of this sort.

There is a considerable amount of

experimentation going on at present in all the various fields of municipal transportation, and there can be no doubt that the motor truck, if once it has a general and fair trial, will come out with flying colors.

PROTEST FREIGHT CHARGES.

The Lansing, Mich., Chamber of Commerce and the Manufacturers' and Jobbers' Association of that city made complaint against the Central Freight Association, which has a membership in several railroads, that the rates out of Lansing to interstate points on motor car wheels, hubs and brake drums are "excessive, unreasonable and discriminatory". The protest was made at a hearing of the Interstate Commerce Commission June 9.

A revision of Cleveland's traffic ordinances provides that every vehicle, motor or horse drawn, must be equipped with tail lights. The clause is a drastic departure in the new "Safety First" ordinance, operative on everything but a baby carriage. Every vehicle carrying material which projects beyond the dimensions of the body must have a light hanging on the extreme rear end of the load.



Fig. 7—Transfer Wagon of Boston School Committee.



Fig. 8—White Truck Equipped for Pipe Haulage, and Trailer, Which Are Doing Splendid Work in Lynnfield, Mass.

CHICAGO ENFORCING HEADLIGHT LAW.

CHICAGO has begun the enforcement of the headlight ordinance which does not permit motor vehicles equipped with dazzling or glaring lights to be operated on the city streets. The law, which came into effect March 30, provides that a board of motor vehicle headlight inspection be appointed to definitely determine what devices and what arrangements could be permitted as non-glaring.

Lights or devices submitted by manufacturers for inspection are tested first under dark room conditions in a special laboratory at the City Hall. This test is for dazzling or glaring effect alone. The lights that are tentatively approved at this examination are then tested at night under road conditions. Approximately 25 manufacturers, dealers and inventors have supplied from one to four devices each for test. Twelve have been approved by the board, and others are being held subject to further adjustment.

It is the intention of the board to approve, after a fair test, as many lights and devices as reasonably comply with the ordinance, and whenever it has concluded that a rejected device could be changed so as to comply, it has suggested such alterations and offered reinspection.

Whenever a device is approved by the board, a certificate of inspection is issued stating that compliance with the ordinance has been made, and a definite description of the device is incorporated enumerating the exact conditions under which it was approved. Copies of these certificates may be issued by the manufacturer to those who purchase the device and as long as the conditions as to candlepower and adjustment of the headlight are maintained the same as those stated in the certificate of inspection, the owner will be free from molestation by the police. The object of the board, on the whole, is to take away from the policemen the determination of whether or not a certain light is glaring.

It is understood that the ordinance will be enforced for the present only on the streets under the jurisdiction of the city police. The park systems and the boulevards are under the supervision of the police of the different park boards, and so far no definite arrangement has been made toward the application of the non-glaring regulations by these boards. It is stated, however, that the park boards will co-operate with the city police in enforcing the ordinance.

The devices approved are as follows:

Monarch dimmer, made by the Distributors & Manufacturers Company, Chicago. It consists of a frosted celluloid disc to be set against either the inside or outside of the glass.

The Nicholas, made by the Wanner Manufacturing Company, Chicago.

The Daylight dimmer, made by the Dimmer Company of America, Chicago. This comprises a celluloid shutter, which is opened and closed by an attachment on the lights.

The Evening Star, Herman Manufacturing Company, Chicago. A series of opaque glass shutters are set just inside the glass front of the lamp and incline slightly upward and backward. Applicable to acetylene lamps.

The Ritter lamp, made by J. S. Ritter, Chicago. It comprises a molded glass of alternate concentric opaque and clear rings.

The Ellis deflector, made by the Ellis Time Stamp Company, Chicago. A metal construction so designed that it is applicable to any lamp in service. A series of tilting shutters project the rays downward.

Vesta Eclipse, made by the Vesta Accumulator Company, Chicago. It comprises a ground glass, except a circular area in the centre, which is covered by a removable metal disc attached to the outside of the glass, the disc to be utilized in the city. A ground glass device is also made, replacing the usual glass.

Safety First Non-Glare, produced by Charles G. Molam, Chicago. It consists of a parabolic mirror reflector of white enamel with a painted metal cap for fitting in front of the bulb.

The Fowler, made by the Fowler Lamp Company, Chicago. It comprises a concave opalescent or milk white glass.

Nodaz, made by the Ward Leonard Electric Company, Bronxville, N. Y. This device consists of a pair of translucent wings, pivotally mounted, opened and closed by means of electric magnets.

Challen, made by the Challen Anti-Glare Company, Chicago. It is placed inside of the lamp and consists of two annular parts of different diameters placed in front of the centre, but so arranged as to diffuse the rays. It is adaptable to electric and acetylene lamps.

Auxiliary bulbs, Vesta Accumulator Company, Chicago. An auxiliary four-candlepower bulb is substituted for the usual member and is placed close to the upper part of the reflector.

Other devices approved include the J-M, made by the H. W. Johns-Manville Company, New York City; the P. G. N. lamp, made by the J. P. Pagin Lamp Company, and a design by the American Double Lens Glass Company of Chicago. It is stated that frosted bulbs will be approved by the board.

NEW YORK MAKES TESTS.

Under the direction of the technical committee of the Safety First Society, a number of non-glaring devices were tried out in New York City recently. The designs were fitted to machines and the cars were driven over all types of roads, so as to bring into play every factor needed in eliminating the glare from the headlights. No reports or awards were made, the work being simply a demonstration for the officials. Mitchell May, secretary of state of New York, and Borough President Marcus M. Marks, Borough of Manhattan, were among the observers.

CHICAGO-INDIANAPOLIS SOCIABILITY RUN.

Cyclecar Enthusiasts Complete 440-Mile Run Over Sandy and Muddy Roads to Speedway Races and Return---Woods Mobilette Acts as Pacemaker.

THOSE who have questioned the practicability of the cyclecar for touring or its ability to negotiate rough country roads will find ample

proof of the capabilities of these little machines in the successful termination of the sociability run from Chicago, Ill., to Indianapolis, Ind., and return, a total distance of 440.4 miles. Much of the route was over sandy and muddy roads with steep grades, but the cars came through in fine condition. In the last leg of the journey, about 135 miles, there were numerous stretches of bad going, which compelled slowing down the machines to about 10 miles an hour, but excellent time was made. On the first day's run the ther-

mometer registered 96 degrees, but in spite of the intense heat no tire or mechanical troubles were experienced by any of the participants.



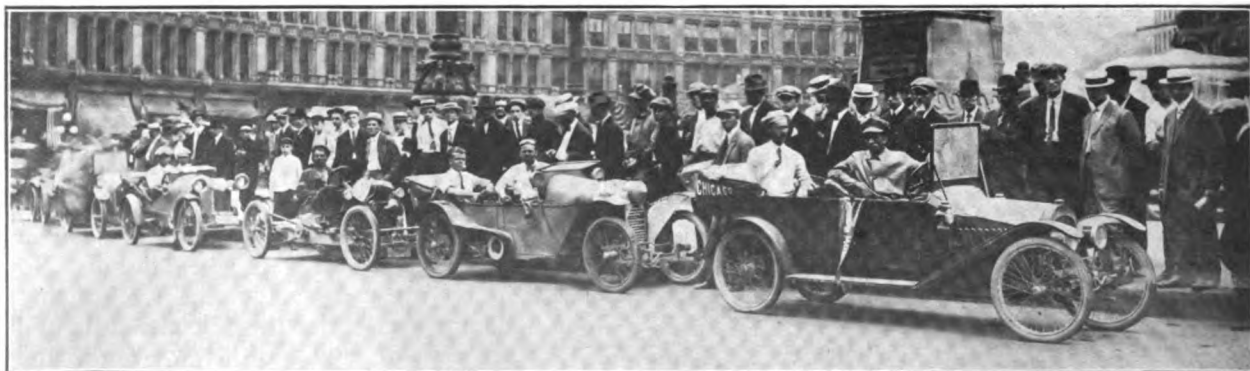
Woods Mobilette, Official Pacemaker in Sociability Run of Cyclecars from Detroit to Indianapolis, Ind., and Return—The Car Was Piloted by Wallace Bucher—O. Richard Wolfe, Captain of the Run, Is Shown in the Rear Seat.

The tour was participated in by Chicago and Detroit cars, one group leaving the former city at seven in the morning on May 28, the other members leaving Detroit about the same time, meeting the Chicago contingent at Rochester, Ind., from which point they travelled together to Indianapolis. Just outside the city the tourists were met by a large number of cyclecars and a motor truck carrying a brass band, and escorted to the monument, where pictures were taken.

The 235-mile run from Chicago to Indianapolis was accomplished in two stages, 143 miles

being made the first day. The return trip was made over a different route, with the exception of the first 31 miles, the distance being 204 miles.

The Woods Mobilette, made by the Woods Mobilette Company, Chicago, was the official pacemaker, and was driven by Wallace Bucher, the construction manager, who was accompanied by O. Richard Wolfe, captain of the run. The machine rolled into Indianapolis on schedule time and arrived at the showrooms of the company in Chicago without experiencing any other



Cyclecars Grouped About Monument After Arrival in Indianapolis, Ind., from Detroit—From Right to Left, Woods Mobilette, Official Pacemaker; Scripps-Booth, Mercury, Dudley Bug, Vixen.

trouble than the changing of a shoe just after leaving Rochester. A cut from a broken bottle was the cause of the delay. Although the machines were averaging 20 miles an hour, the pacemaker caught the other cars and assumed its official position.

On the last leg of 135 miles an average speed of 24 miles an hour was maintained, and at times a speed of 40 miles an hour was attained. It was demonstrated that on rough country roads the narrow tread of the cyclecar is an advantage, and that holes in the roads can be avoided by passing between them.

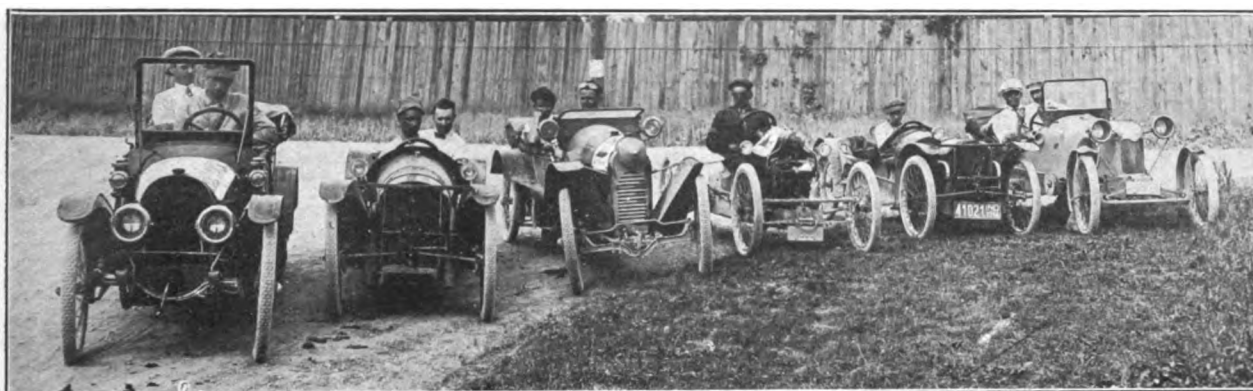
The Woods Mobilette Company has reason to be proud of the performance of its product, as the pacemaker car averaged better than 20 miles an hour in the run to Indianapolis, and over 24 miles an hour on the return trip. At the night and noon stops the cars attracted considerable attention from the residents of the country

for 150 miles at a 20-mile-an-hour schedule and three controls. Many leading cities and towns will be visited.

President Percival offers a silver trophy to the make of car finishing with the largest number of clean scores, and another cup will be given by President W. H. McIntyre of the Imp Cyclecar Company of Auburn, Ind., for the driver having the best general efficiency score. Silver cups will be awarded for the different classification winners, also perfect score certificates. Entry blanks and complete details can be obtained by addressing Dr. Charles G. Percival, president of the Cyclecar Club of New Jersey, Teaneck, N. J.

FUEL IS CHEAPER.

The price of gasoline has again been reduced in Kansas City, Mo. The latest drop, from 12 to 10.8 cents a gallon, makes a decline of 4.7 cents



Showing a Group of Drivers and Cyclecars Photographed in Indianapolis—From Left to Right, Woods Mobilette, Imp, Scripps-Booth, Mercury, Imp, Dudley Bug.

through which they passed. The successful completion of a tour of 440 miles over varying road conditions afforded ample opportunity for testing the efficiency of the various makes represented.

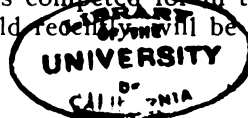
NEW JERSEY CLUB PLANS RUN.

Plans are being promulgated by the Cyclecar Club of New Jersey to hold a 350-mile reliability run on Sept. 6, 7, 8, according to Dr. Charles G. Percival, president of the club. The start will be made from Newark, N. J., on Saturday afternoon, Sept. 6, and the night stop will be at Trenton, where the tourists will be entertained with a theatre party. The second day's run will be to Philadelphia, with the noon control at Atlantic City, where a stop will be made to allow the contestants to take a dip in the surf. The return to Newark will be over a different route, which calls

since November. The last cut was made by the Standard Oil Company and was immediately met by the independents, who have met all cuts promptly.

Braender tires will be used by several prominent drivers in the Sioux City races, July 4, according to the Braender Rubber & Tire Company, Rutherford, N. J. William Chandler, Ralph Mulford and Richenbacker will equip their cars, the "Braender Bulldog", Peugeot and Duesenberg Special, respectively, with the Braender product.

The next meeting of the Cyclecar Club of New Jersey will be held at one of the leading hotels at Newark. It will be preceded by a luncheon, at which the McIntyre trophy and other cups competed for in the cyclecar competitions held recently will be awarded.



SCRIPPS-BOOTH STARS AT TEANECK RACES.

THAT the cyclecar has arrived was demonstrated by the very successful race meet held under the auspices of the Cyclecar Club of New Jersey, which organization has the honor of being the first to give a meeting in this country under the sanction of the Cyclecar Association of America. The contests, which were varied, were held Saturday, June 13, at Teaneck, the farm of Dr. Charles G. Percival, president of the Cyclecar Club of New Jersey.

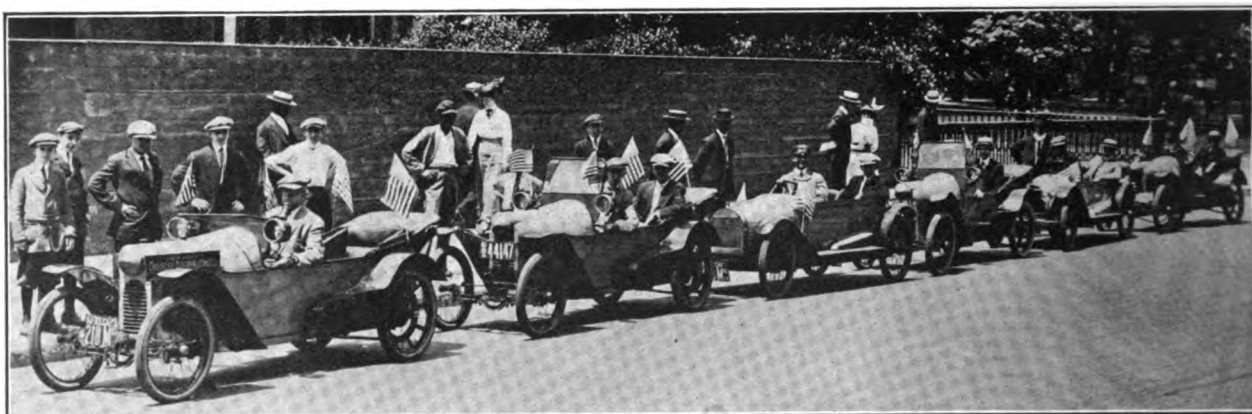
Four events were on the card, these comprising a slow race, up grade on the high gear; reverse gear event, 75 yards, up grade; highest average or secret time, and a hill climb. The machines were divided into classes, according to the classification adopted by the Cyclecar Asso-

ident of the Cyclecar Manufacturers' National Association, for the driver who scored the largest number of points in the meet.

The manufacturer's cup in the cyclecar class was won by the Scripps-Booth team, captained by H. C. Fairchild of Newark, N. J., with 30 points. The two Twombles, driven by F. Haag and G. A. McLaren, the Newark distributors, won the manufacturer's cup for the light car class with 20 points.

The events took place over a specially constructed track 50 feet wide and 1500 long. Dr. Percival took special pains to make it as uneven and as steep in grade as possible, it having a gradient of one in seven.

The races were preceded by a 38-mile endur-



Some of the Participants in the Endurance Run from Newark to the Farm of Dr. Percival, Where the First Cyclecar Meet Was Held.

ciation of America, comprising the cyclecar, having motors of not more than 71 cubic inches cylinder displacement and 750 pounds chassis weight; light cars, with motors of not more than 101 cubic inches cylinder piston displacement and 950 pounds chassis weight, and small car class, having motors of not more than 125 cubic inches cylinder displacement and 1150 pounds chassis weight.

William Bouldin, 3rd., of East Orange, N. J., carried off the honors at the meeting with his Scripps-Booth stock cyclecar, winning the hill climb, reverse gear race and secret time event. The slow race was also won by a Scripps-Booth, P. G. Scull of Newark, N. J., being declared the winner over James Pearsons of New York City, who drove an O-We-Go. Bouldin captured the McIntyre cup offered by W. H. McIntyre of the Imp Cycle Car Company, Auburn, Ind., and pres-

ance run from Newark through the towns of Bloomfield, Passaic, Paterson, Hackensack, Arcola and Bogota, to the farm of Dr. Percival, where the club members, cyclecar trades people and contestants were entertained at luncheon previous to the contests. A number of out-of-town guests were present, including officials from cyclecar manufacturing concerns. All of the machines finished with a perfect score, completing the distance in one hour and 18 minutes.

The events were held under the rules compiled by the contest committee of the Cyclecar Association of America, which governs all cyclecar competitions in the United States. The meet was a success from every viewpoint. The summary of the events follows:

1000-Yard Hill Climb.

Cyclecar Class—Won by William Bouldin, 3rd., East Orange, N. J., Scripps-Booth; second, James Pearson, New York City, O-We-Go; third, H. C. Fairchild, Newark, N.

J., Scripps-Booth; fourth, P. G. Scull, Newark, N. J., Scripps-Booth. Time, 26 seconds.

Light Car Class—Won by F. Haag, Newark, N. J., Twombly; second, G. A. McLaren, Newark, N. J., Twombly. Time, 27 seconds.

75-Yard Reverse Gear Race.

Cyclecar Class—Won by William Bouldin, 3rd., East Orange, N. J., Scripps-Booth, time, 18 seconds; second, H. C. Fairchild, Newark, N. J., Scripps-Booth; third, James Pearsons, New York City, O-We-Go; fourth, P. J. Scull, Newark, N. J., Scripps-Booth.

Light Car Class—Won by G. A. McLaren, Newark, N. J., Twombly, time, 20 seconds; second, F. Haag, Newark, N. J., Twombly.

75-Yard Slow Race.

Cyclecar Class—Won by P. G. Scull, Newark, N. J., Scripps-Booth, time, 4 minutes, 40 seconds; second, James Pearsons, New York City, O-We-Go; third, H. C. Fair-

child, Newark, N. J., Scripps-Booth; fourth, William Bouldin, 3rd., East Orange, N. J., Scripps-Booth.

Secret Time Race, 1.5 Miles.

Cyclecar Class—Won by P. G. Scull, Newark, N. J., Scripps-Booth, time, 4 minutes, 28 seconds; second, William Bouldin, 3rd., East Orange, N. J., Scripps-Booth; fourth, James Pearsons, New York City, O-We-Go.

Light Car Class—Won by F. Haag, Newark, N. J., Twombly, time, 4 minutes, 10 seconds; second, G. A. McLaren, Newark, N. J., Twombly.

Imp Trophy Cup for Greatest Number of Points in Cyclecar Class—Won by William Bouldin, 3rd., East Orange, N. J., 13 points; second, F. G. Scull, Newark, N. J.; third, James E. Pearsons, New York City; fourth, H. C. Fairchild, Newark, N. J.

Manufacturers' Cup, Cyclecar Class—Won by Scripps-Booth team.

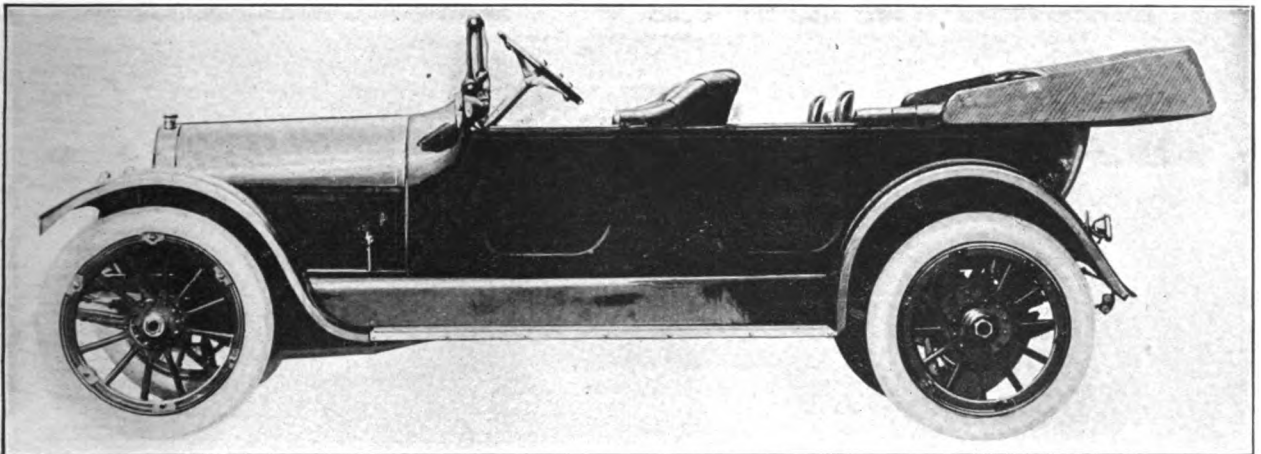
Manufacturers' Cup for Light Car Class—Won by Twombly team.

WILLYS ANNOUNCES NEW SIX-CYLINDER CAR.

AN ANNOUNCEMENT of more than general interest to the automobile trade and public, but particularly so to the many dealers handling Overland cars, is that the Willys-Over-

land with so complete and inclusive a line as to enable them to satisfy the demands of all customers with the product of a single manufacturer.

After having been passed upon by Mr. Willys



Overland Six-Cylinder Seven-Passenger Touring Car, Announcement of Which Is Made by the Willys-Overland Company—The New Machine Is Provided with Every Convenience and Will Sell for \$1475.

land Company, Toledo, is to market a seven-passenger, six-cylinder car, with every modern convenience, to sell for \$1475.

So quietly were the plans made that no inkling of Mr. Willys' intention to enter the six-cylinder field was made public until recently, although the Overland engineers have been developing and testing the new car for some time. It is stated that the machine embodies the best of material and workmanship. The design is founded on sound engineering practise. The retail price is made possible by the quantity production of the factory, which produced 50,000 four-cylinder cars this year.

While a larger number of four-cylinder machines will be built in 1915, the new car will serve the purpose of providing the Overland dealers

and his sales staff, the production of the new six will progress with the usual Overland celerity, so that an adequate supply will be ready for the market late in the summer or early in the fall.

In appearance the Overland six is stylish and attractive. It has a long stroke motor, rated at 45-50 horsepower, streamline body, 35 by 4.5-inch tires and demountable rims, electric lighting and motor starting, as well as other modern conveniences. The wheelbase is 125 inches.

The Eighth Annual Touring Number of The Automobile Journal, to be published July 10, will be the most comprehensive ever compiled. It will be replete with hundreds of new photographic reproductions of scenes of interest and beauty.

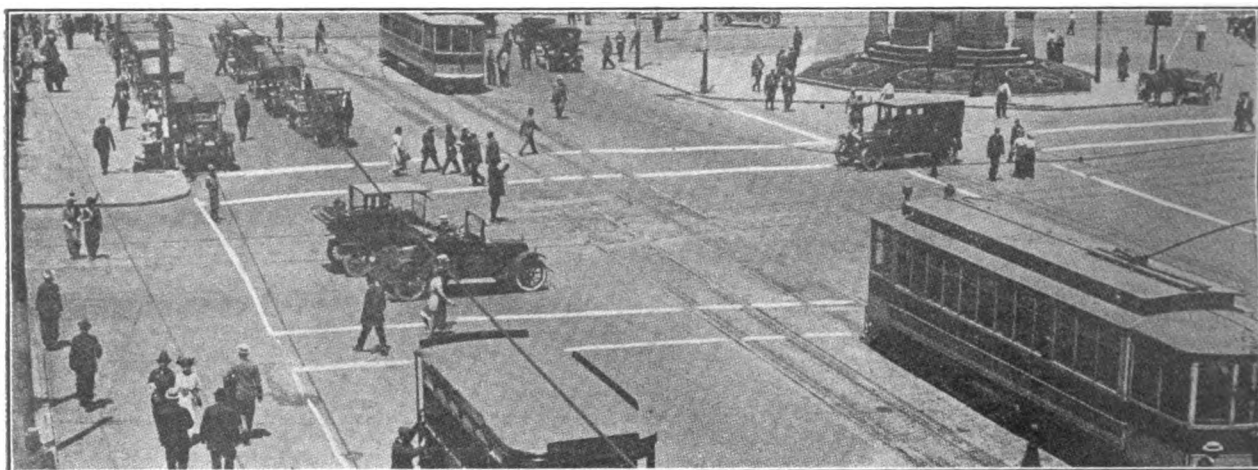
DETROIT ADOPTS SAFETY TRAFFIC RULES.

DETROIT'S new traffic rules, which make for safety of the pedestrians and permit of parking motor cars more compactly, are being taught to the automobilists, pedestrians and other users of the streets. Traffic is more complicated in Detroit because of its practically one main street, Woodward avenue, which thoroughfare is very popular with motorists.

The more important improvement in the regulation of traffic is the marking off of special spaces across the streets for the exclusive use of the pedestrians. These spaces have the width of the sidewalk, an average of 18 feet, and are marked off with white paint, as shown in the accompanying illustration. All vehicles, horse drawn, motor driven, street cars, bicycles, etc.,

in this space". These signs are easily read.

Of the estimated 17,000 automobiles owned in Detroit, it is stated that between 2500 and 3000 are parked daily between the hours of 11 and 5 o'clock within a radius of half a mile from the City Hall. The first improvement the traffic department inaugurated was the parking of the cars in the business district. In the more important streets and those wide enough, eight-foot spaces have been marked off for a distance of about a quarter of a mile. All machines are parked obliquely, instead of lengthwise, and it is estimated that three times as many cars can be parked by this method than were formerly. It is figured that, with 190 cars parked obliquely, a saving of 760 feet of space is effected in a short distance.



Showing Detroit's Busiest Corner, Woodward Avenue and Fort Street, and the White Safety Lines for Pedestrians.

must stop in front of the first white line. Pedestrians are requested to cross the streets within the lanes or marked spaces. Whenever someone crosses beyond the marked lines, the traffic officers stationed at the crossings signal to him or stop him when possible, and call his attention to the white lines, as well as request that he must not cross the street or square outside the marked lines.

Small posts, bearing the following inscription, are placed, during the hours when traffic is most heavy, at the principal crossings, on both sides of the car tracks: "Vehicles must not stop on crosswalks. Drivers will be prosecuted". Another sign is "Danger. Cross with the cars". On the curbs or sidewalks on several streets and in front of theatres and big stores are posts bearing the following notice: "Motor cars must not park

The new regulations are to be rigidly enforced. If the machines are not parked properly the officers propose to tow them to the nearest police station, where their owners will be warned and arrests will follow the second offense. Minneapolis, St. Paul, Indianapolis and other cities have adopted the safety lines, and policemen are empowered to force pedestrians disregarding the rules to return to their starting point and cross within the zones.

Complete Directions are supplied in the Eighth Annual Touring Number of The Automobile Journal, with detailed mileage points and total miles from the night stop, both going and returning. The value of this routing cannot be over-estimated, since it permits of using the itinerary in any way desired.

SUNBEAM WINS TOURIST TROPHY RACE.

THE ORDER OF FINISH.

No.	Car and Driver	Time	MPH.
4	Sunbeam, K. Lee Guinness.....	10:37:49	56.44
19	Minerva, Riecken.....	10:57:38	54.74
12	Minerva, Molon.....	11:22:20	52.76
3	Straker-Squire, Mitchell.....	11:22:50	52.72
1	Minerva, Porporato.....	11:40:44	51.35
8	D. F. P., Bentley.....	12:24:01	48.38

A SUNBEAM car, driven by K. Lee Guinness, retained the supremacy of England in the Tourist trophy race held on the Isle of Man circuit, June 10 and 11, breaking all records for the event by averaging 56.44 miles an hour for 600 miles, 300 of which were driven on June 10. It was the fifth win for England since the classic event began with the Gordon Bennett trials in 1904, when C. Jarrott, driving a Wolseley, won with a mean speed of 35.5 miles an hour. The best previous record up to Guinness' performance was 50.5 miles an hour, by W. Watson in a Napier in 1908, but this contest was but 339.5 miles.

New Record Established.

Guinness made excellent time when it is considered that the circuit abounds with many steep grades and tortuous turns and that the race was limited to motors with a piston displacement of 202 cubic inches. He put the Sunbeam to the front in the first lap in the opening day and was never headed. During the first eight laps of the 37.5-mile circuit he averaged 57.5 miles an hour, and his fastest lap was at a rate of 59.3 miles an hour. But six machines finished, the Minerva, equipped with a sleeve valve motor of the Knight type, taking second, third and fifth places, thereby winning the team prize of \$1500 offered for the best average of a team of three cars in the race. A Straker-Squire, an English machine, finished fourth, while sixth went to the D. F. P., a representative of France. Of the 23 cars entered 14 were eliminated because of mechanical troubles, two upset and one did not start because of a burst flywheel. The showing of the specially designed Vauxhalls was a keen disappointment, two going out in the first lap of the first day, while the other upset in the 13th lap.

Special Motors Used.

The majority of the cars were equipped with special racing motors and were restricted to a minimum weight of 2408 pounds. The chassis were required to have a minimum tread of 54 inches, and a wheelbase of not less than 108. Under the rules all machines had to be fitted with mufflers or an effective means of silencing the exhaust that would meet with the approval of the

judges. The use of any kind of fuel was permitted.

Two of the Sunbeams took the lead from the start when one was forced out by a broken universal joint in the 12th lap. Very little tire trouble was experienced, and with the exception of the German cars Dunlop tires were used on all machines. The drivers of the Minervas furnished the thrills, taking corners at high speed. These cars were early protested because of the excessive smoke, but the judges overruled the protest.

Fast Time on Hill.

Time was taken of the contestants on one of the mountain climbs on the circuit. Many of the leaders averaged 55 miles an hour, remarkable speed for such small machines. Under the rules the contestants had to cover eight laps or 300 miles each day.

The motor used in the winning Sunbeam is a special design with valves in the head. The four cylinders are cast en bloc and have a bore of 3.18 inches and stroke of 6.29. The engine is very compact and has a small appearance when compared to other types because of the use of two separate cases for the camshafts. Two intake and two exhaust valves are fitted to each cylinder, and by using two camshafts rocker arms are eliminated. Instead of a roller a very light rocking finger is interposed between the cam and the pushrod. Drive is by a train of spur gears.

Features of Sunbeam.

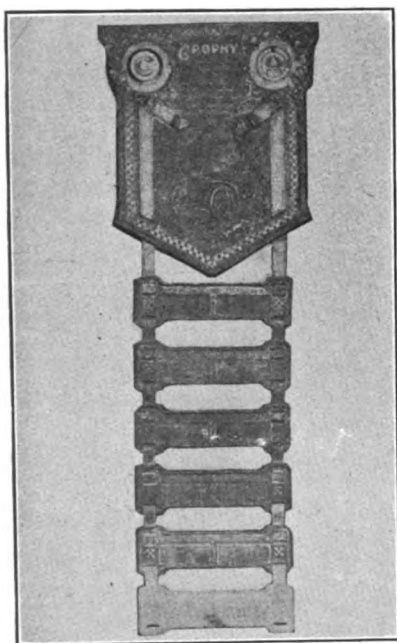
Another departure from Sunbeam practise is the use of a ball bearing crankshaft. Three bearings are employed, and in order to mount the centre bearing the crankshaft is made in two parts. Balancing masses are used and these are light. Lubrication is by air pressure from a dash tank and there is a pump in the sump which exhausts it, returning the oil to the tank. The clutch is a Ferodo-faced cone and a clutch brake of large size is employed. The gearset is of the four-speed type and behind it is an expanding design of brake. The axle construction is conventional, but the propellor shaft is exposed and has two universal joints. The rear springs are underslung semi-elliptic and both front and rear sets are equipped with Houdaille shock absorbers.

The Information presented in the Eighth Annual Touring Number of The Automobile Journal, July 10, could not be secured in any other form for less than 100 times the price.

C. A. C. WINS INTERCLUB MATCH.

Defeats Chicago Automobile Association in Annual Contest, for First Time in Five Years, by Revised Score of 188 to 246—Seventeen Perfect Score Cars.

WHAT may be termed the most important touring contest of the season, now that the Glidden tour has been abandoned, is the annual interclub team match between the Chicago Automobile Club and the Chicago Athletic Association, a contest for the private owner and one in which no one in the trade is permitted to take part. For seven years the rivalry between the organizations has been very keen and the winning of the event, held on June 12 and 13, by the Chicago



The Interclub Trophy.

Automobile Club, is its first since 1909, the Chicago Athletic Association having five bars on the interclub trophy.

The run was from Chicago to Peoria, Ill., and return, a total distance of 360 miles, and the C. A. C. won by a revised score of 188 to 246 for the C. A. A. The latter was represented by 12 cars and had few points penalty, but, owing to its having a smaller team, it was charged a full point each time, while the C. A. C., with 15 cars, was penalized twelve-fifteenths of a point. Also it had two more perfect score cars, which cut down its demerits. As will be noted by an accompanying table, which gives the penalties by day and credits, the C. A. C. had 10 perfect score machines, and the C. A. A. seven.

The regulations evolved by the Chicagoans are simple. They penalize for work and time and for motor stops, and instead of being an individual affair the demerits are charged against the team. As a result the contestants take long

chances. Recognition is made of a driver who has a clean score, five points being awarded. According to the rules it is not necessary that the teams be equal in number, as a fractional penalization is made where one team is larger than the other.

The second day's run from Peoria, Ill., to Chicago, was marred by rain and the muddy roads were responsible for the spoiling of several perfect scores. At Peoria the Chamber of Commerce, the Peoria Country Club and the Creve Coeur Club played hosts to the tourists, who were accompanied by a number of prominent Chicago city officials. The rules that governed the contest were as follows:

Entries.

The contest shall be a team match between teams composed of members of the two organizations above named, who are not identified with the motor industry, and who must own the cars they drive. Sons of members may drive as heretofore. The team with the fewest points penalization shall hold the trophy. The losing team shall pay for a dinner to be given the winners immediately following the completion of the match.

Cars.

There shall be no restriction as to cars entered other than that they shall be fully equipped according to catalogue specifications.

The contest shall be run under grade three of the American Automobile Association classification, which reads as follows: "A contest of any duration in which penalties are imposed for time and road work only, but in which the final operative test and preliminary and final technical examinations provided for in rules 435, 502, 504, 505, 506 and 516 are omitted, shall be known as a contest of the third grade under the rules of the A. A. A."

Penalizations.

The winning team shall be that team which has the fewest penalizations according to the following schedule:

Time.

One point per minute or fraction thereof, late in arrival at any control or checking station, each car being given a leeway of three minutes to allow for a difference in watches. In case of penalization due to work done on the car on the road, the time taken in doing the work will be added to the running time to the next control.

Credits.

For each perfect score a credit of five points will be given the team which this car represents. In case of teams of unequal size, a fractional credit will be given the same as when penalties are fractionalized.

One point per man per minute, or fraction thereof, for labor by driver or passengers.

Two points per man per minute, or fraction thereof, for labor by workmen other than driver or passengers.

Two points per man per minute, or fraction thereof, for replacement of damaged parts by drivers or passengers.

Four points per man per minute, or fraction thereof, for replacement by workmen other than driver or passengers.

Three points per occurrence for replenishing gasoline, oil, or water, outside of fuel controls.

Motor Stops.

One point per minute, or fraction thereof, for motor stop when no work is done. No penalty for motor stop

during period when work is being done on car, for which work or replacement a penalty is imposed. (See A. A. A. rule 519.) There shall be no penalty for motor stops occasioned by signals of drivers of horse drawn vehicles, observer to be the judge.

Rule 519. Motor Stops.—Motors may be stopped at controls and while gasoline is being taken on. Other stoppages of motors between the starting and finishing of each day's run, except for tire trouble, will result in a penalty of one point per minute or a fraction thereof for time stopped when no work is done on car. No penalty, however, shall be charged for a motor stop during the time occupied by a replacement or work in a car for which replacement or work a penalty is imposed. Cars can check in at the night controls only on schedule time just the same as at noon. If entrants get in control ahead of time, motor must be kept running until time is up.

Motors of White steamers may be stopped for not exceeding 10 seconds in order to disengage the clutch when stopping or starting the car; also the motors of Stanley steamers must necessarily be stopped while the car is stopped. Steam cars may be stopped without penalty in order to replenish the water tank at the fuel controls. Cars cannot voluntarily leave the course.

Stopping the motor to put on tire chains will be permitted.

There shall be no penalty for tire work except in case the contestant fails to finish within two hours of his

Accidents to accessories will not be penalized except in case of shock absorbers, which will be charged at the rate of two points per man per minute taken in repairing same.

In case the contesting teams are not of equal size, the smaller team shall be penalized according to the above schedule, while the larger team shall be given a fractional penalization, the numerator of which fraction shall be the number of cars in the smaller team and the denominator of which fraction shall be the cars in the larger team.

Women Not Eligible.

No women are allowed to participate either as passengers, observers or drivers in the team match.

In case of illness after the start emergency drivers may be used.

Drivers must not rely upon information obtained from observers as to route to be followed or as to any question as to penalties or rules.

Each car must be checked in with the starter 30 minutes before the start or else be penalized one point per minute for each minute late in reporting after that time. This means 6:30 a. m.

Observers.

The joint committee shall appoint observers, one for each car, and said observers shall occupy the seat beside the driver throughout the run. Each observer shall be provided with a blank form on which record shall be

SHOWING PENALIZATION OF CARS IN TWO-DAY CHICAGO INTERCLUB CONTEST.

CHICAGO AUTOMOBILE CLUB.

Penalties.		First	Second	Cred-	
Driver	Car	Day	Day	Total	its
J. T. Brown, Moline-Knight.....	0	0	0	0	0
John Kercher, Jeffery.....	0	0	0	0	0
E. G. Watrous, Stavery.....	0	0	0	0	0
George Hibben, Columbia.....	0	0	0	0	0
G. F. Kelly, Cole.....	0	0	0	0	0
J. E. Callender, Edwards-Knight..	0	0	0	0	0
H. W. Sehl, Norwalk.....	0	0	0	0	0
C. G. Sinsabaugh, Chalmers.....	0	0	0	0	0
B. B. Ayers, Cadillac.....	0	0	0	0	0
G. F. Ballou, Apperson.....	0	0	0	0	0
A. N. Eastman, Mitchell.....	0	1	1	1	0
R. R. Duff, Chalmers.....	0	2	2	2	0
W. Mersbach, Packard.....	1	0	1	1	0
D. A. Hatch, Paige-Detroit.....	11	10	21	0	0
W. G. Leininger, Palmer-Singer...	0	250	250	0	0
Total penalization.....	12	276	228	40	
Final score, 188.					

CHICAGO ATHLETIC ASSOCIATION.

Penalties.		First	Second	Cred-	
Driver	Car	Day	Day	Total	its
F. X. Mudd, Lozier.....	0	0	0	0	5
A. Ortmyer, National.....	0	0	0	0	5
G. B. Dryden, Cadillac.....	0	0	0	0	5
S. E. Hibben, Packard.....	0	0	0	0	5
W. W. Harless, Packard.....	0	0	0	0	5
J. E. Fadner, Auburn.....	0	0	0	0	5
L. T. Jacques, Peerless.....	0	0	0	0	5
C. T. Knisely, Diamond T.....	1	0	1	0	0
W. F. Grower, Diamond T.....	5	15	20	0	0
F. H. Judd, Knox.....	0	9	9	0	0
C. F. Meyer, Peerless.....	0	2	2	0	0
B. D. Jones, Stearns-Knight.....	1	250	251	0	0
Total penalization.....	7	276	283	35	
Final score, 246.					

Note—The Chicago Automobile Association had fewer points penalty, but owing to its having a smaller team it was charged the full point penalty each time, while the Chicago Athletic Club, with three more cars, only was penalized twelve-fifteenths of a point. Also it had two more perfect score cars, which cut down its demerits.

schedule time at any control, when he is penalized 200 points; if more than three hours late, he is given 250 points for that day. Failure to finish either day's run incurs a penalty of 250 points, or 500 points for both days.

Motor stops will be allowed without penalty for tire repairing, but in such an event the tire must be entirely deflated by puncture or accident, of which the observer shall be the judge.

The total maximum penalization for any car shall be 400 points for both days, except in case of withdrawal.

A penalty of 200 points will be imposed for failure to finish each day's run within two hours of the scheduled time or for disqualification for any cause each day, 250 points for that day.

Penalties.

A contestant withdrawing from the match shall incur a penalty of 500 points. If a contestant is more than three hours late at either night control he is automatically withdrawn from the contest and is penalized 500 points.

Lubricators must not be adjusted during the match, but grease cups may be screwed down at controls. Oil, water and gasoline may be taken on at controls only.

In working on tires a driver may receive assistance from passengers without penalty.

In working on a car a driver may receive assistance from passengers, but the usual penalties will apply.

made of any occurrence which receives penalization. He shall also see that this blank form is handed to the checker at each control or checking station, in order that the time of arrival may be stamped thereon, receiving same from checker after the time has been marked. At the end of the run the observer must sign his card and hand it to the judges at the finishing point.

Running Regulations.

Entrants must conform to the laws and ordinances of the road and shall show due consideration to other participants in the tour and other users of the highway. Arrest for violation of the speed laws will result in a penalization of 10 points for each and every offense.

Protests.

All protests as to entries must be made to the referee before the start. All other protests must be made during the run on or before noon the next day after the contest, and must be in writing.

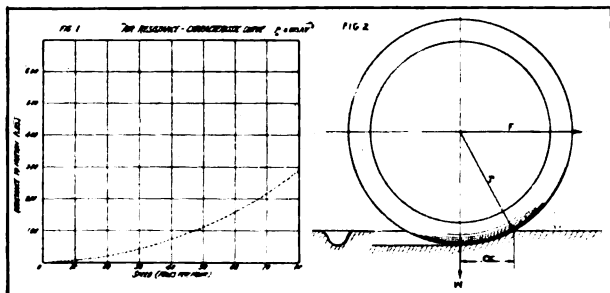
Regulations.

Every entrant must become acquainted with these rules and by entering agrees to abide by them. He shall hold the Chicago Athletic Association and the Chicago Automobile Club harmless and indemnify them against any loss or damage directly or indirectly growing out of the operation, management or control of the car entered by him from the time it starts in the contest until the completion of the contest.

ENGINEERS CONVENE AT CAPE MAY.

President Leland Opens Semi-Annual Meeting of S. A. E. with Pertinent Address—
Taxation of Motor Vehicles One of Many Interesting Papers.

THE semi-annual meeting of the Society of Automobile Engineers at Cape May, N. J., opened with the standards committee meeting



Tuesday afternoon, June 23, which was followed in the evening by a meeting of the boards of governor sections.

The business session Wednesday afternoon was inaugurated by the address of President Henry M. Leland, who is so well known to the automobile industry that comment is unnecessary. He spoke of the opportunities of the engineer, both from the engineering standpoint and as men, and complimented the members of the automobile industry. He said in part:

Perhaps more closely related to engineering interests is our standing and affiliations as engineers. It was my privilege in 1910 to be entertained with some of you, by the Institute of Engineers of Great Britain, with a large party of the members of the American Society of Mechanical Engineers. In the summer of 1913 I again had the privilege of going with the same society when we were entertained by the German Engineering Society in 12 of the principal cities of Germany. We were most royally entertained and the trip was from the beginning a revelation of the most interesting experiences for a mechanical engineer. One thing that impressed itself very strongly upon me was the greater, the better standing which the engineers of both Germany and England seem to have with their governments and communities, as compared with conditions in this country.

In many ways we saw unmistakable evidence of the better standing of the engineering profession in both these countries than we enjoy here in the United States. In casting about for a reason for this state of things, it occurred to me that it may be due to the fact that in both these countries all the various classifications of engineers are merged together in one great national engineering organization. This gives far reaching and more important dignity and standing to the profession and I hope that measures will be taken in the not distant future to have all engineering societies in the United States join in a like organization.

The automobile engineers of America have the greatest reason to be proud of the progress and development of their profession in the very few years of its existence. History has nothing to record to compare with it. This progress would not have been possible except for the peculiar genius of our trained young men which enables them to think and act quickly and accurately.

Similarly the members of the Society of Automobile Engineers have cause to feel pride in their organization which has so quickly and thoroughly shaped itself into the technical heart and head of the industry. It draws together in personal fellowship all members of the great family. It unitedly solves the problems which none alone could master.

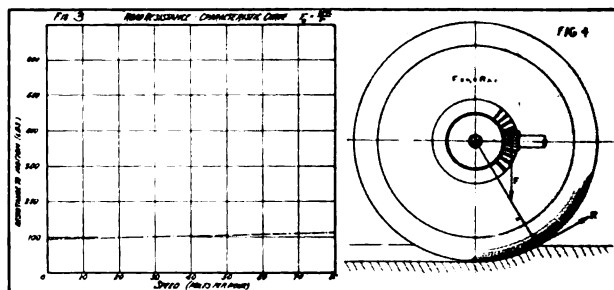
Taxation of Motor Vehicles.

One of the most interesting papers to be presented at the meeting is that to be read on Thursday, June 26, when C. O. Egerton and S. I. Fekete, members of the society, will read "An Engineering Basis for Taxation of Motor Vehicles", which discussed the wear of highways from an engineering point of view. The paper follows:

Within the last 10 years the highway builders of this country and Europe have been compelled to make radical and costly changes in their methods of road construction. That these changes have been occasioned largely by the introduction of automobile traffic is undeniable, for the problem of economic construction and maintenance of roads for horse drawn vehicles was satisfactorily solved approximately a century ago by English and Continental road builders.

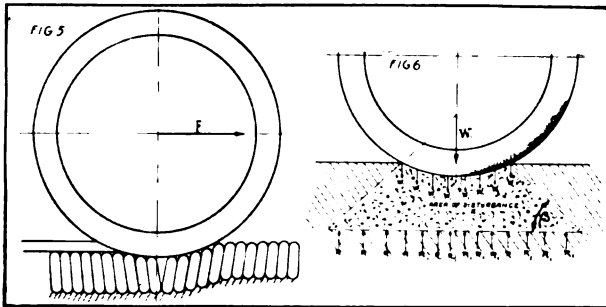
But because automobile traffic has destroyed roads which successfully sustained animal propelled vehicles, let us not indict it with wanton destruction of property until its side of the case has been fairly presented. If we were to take a typical automobile and a typical horse and wagon of equal weight and move them over parallel stretches of equally good roads at equal speeds until the road surfaces were no longer fit for economical use, we would probably discover that the roads would wear out at very nearly the same time. If one road lasted longer than the other it would quite possibly be the road traversed by the motor car.

Actually, then, the cause of the increase in road destruction is due in the first place to the speed at which the motor car can move as compared with a horse and wagon; and in the second place to the increased volume of automobile traffic as compared with animal traffic. The cause for the former popular demand for a specific automobile tax arose probably from the fact that the motor car when first introduced was considered a luxury, while the horse and wagon have been regarded as necessities from time immemorial. At the present day, however, this distinction is certainly obsolescent if not obsolete. While it is essentially illogical that horse drawn



vehicles should be exempt from specific taxation, when they undoubtedly do their share of road damage, it is nevertheless a fact that motor vehicle users are the staunchest supporters of road extensions and maintenance.

nance, as well as the greatest beneficiaries therefrom, and as such should not escape a reasonable share of the expense so entailed, whether the cost is levied as a specific motor car tax or as one upon personal property. As-



suming then that the motor car owner is to pay a reasonable tax, the amount of his contribution should be in direct proportion to the amount of damage which his vehicle is capable of inflicting upon the road surface.

The amount of damage which a vehicle can inflict upon a road is fundamentally dependent upon its weight and its velocity, but in order to better study these elements we must dissect them as far as possible.

The destructive power of weight alone upon a given type of road surface may be summarized as follows:

1. It is proportional to the pressure per square inch of tire contact.
2. It is dependent upon the character of contact, i. e. whether metal, solid rubber, or pneumatic tires are used.
3. It is inversely proportional to the contact diameter of the wheel.

The destructive power of velocity in conjunction with weight upon a given type of road surface is proportional to the linear distance which the point of road contact progresses in a unit of time which is, of course, directly dependent upon the capacity of the motor.

In other words, combining both elements of weight and velocity, the destructive capacity of a motor vehicle is dependent upon the resistance encountered due to contact of various types of wheels with road surfaces at various speeds.

To set forth as clearly as possible the state of equilibrium existing between the forces producing and the forces consuming the vehicle's energy, let us suppose that we have in a convenient place on the moving vehicle two indicators. Let us say that the first indicator registers the speed of the car. The second indicator registers the horsepower acting through the drive wheels at the speed shown by the speed indicator. If now we start the car and gradually increase the speed until we are unable to make our speed indicator register any increase of velocity, we shall arrive at the conclusion that the power registered at that speed by our power indicator is being entirely consumed in overcoming external forces acting upon the car.

The external forces which prevented increase of speed in our supposed car are two in number, and are:

1. The resistance which the surrounding air offers to being displaced by the moving car.
2. The resistance which the road surface offers to being displaced by the wheels of the moving car.

Let us consider the general characteristics of these two resistances.

The work required to move a vehicle against air resistance is proportional to the area exposed and proportional to the square of the velocity at which the vehicle moves. If we plot as a curve the work required to overcome air resistance, using for abscissae the velocities of the moving vehicle in miles per hour, and for ordinates intensity of pressure at each velocity, the curve will be similar to that shown in Fig. 1.

According to the theory of rolling friction, a body passing over a surface produces a depression in that surface. The depth of this depression depends upon the relative hardness of the surface and that of the body.

The force required to produce motion in the above rolling body varies directly as the pressure between the body and the surface; directly as one-half the chord of the arc of depression; and inversely as the radius of the rolling body.

Referring to Fig. 2,

$$F = \frac{W \cdot oc}{r} \quad (1)$$

$$oc = \frac{F}{W} \cdot r \quad (2)$$

W = Weight in pounds upon wheel.
F = Force in pounds to produce horizontal motion.
r = $\frac{1}{2}$ diameter of wheel.
oc = Coefficient of rolling friction.

In this equation the fraction $\frac{F}{W}$ represents nothing else than the force per pound of weight required to cause rolling motion.

The magnitude of the fraction $\frac{F}{W}$ may be accurately determined experimentally from the various combinations of road surfaces, types of tires and wheel diameters in common use at known speeds. Let us suppose we have determined by means of draw bar dynamometer or by retardation the value of $\frac{F}{W}$ required to move various diam-

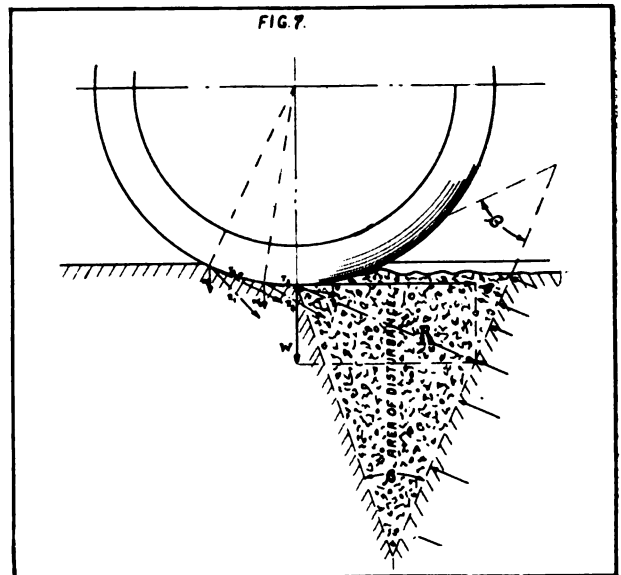
eters of wheels equipped with a certain kind of tire over one class of road surface at known speeds. Having done this we may from equation (2) compute the values of oc for various sizes of wheels for each possible combination of tires and road surfaces. The results of the foregoing computation may then be tabulated; a separate table being made for each combination of tire and road surface and each table giving the value of oc corresponding to various possible diameters of wheel.

If we plot a curve representing the work required to overcome road resistance, using for abscissae the velocities of the moving vehicle in miles per hour, and for ordinates the magnitude of the tractive effort F, which will be required to overcome the force caused by road resistance at that velocity, we will have a curve similar to that shown at Fig. 3.

The force F is in effect that which would be directly exerted by a horse in dragging a vehicle.

In our case we must instead deal with a force tending indirectly to produce horizontal motion by rotating a wheel. In other words, we have a mechanical couple composed of a force F tending to rotate the wheel through the medium of a gear or sprocket; opposing the road resistance R applied at the tread of the tire. (See Fig. 4.)

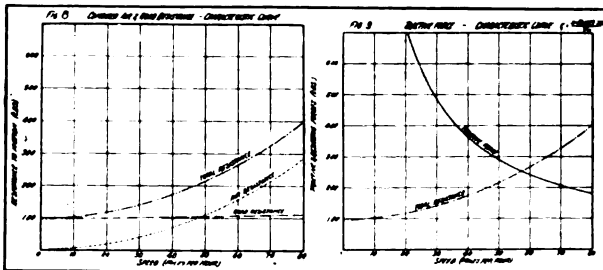
Instead, therefore, of pure rolling action we have a



combination of rolling over the road surface and a tangential force acting between the tire and the road surface.

There will be two stages of the tangential phase:

First, when the torque rotating the wheel is less than the torque due to the adhesion between the tire and road. Second, when the torque rotating the wheel is more than the resisting torque due to adhesion between the tire



and road. In other words, the two stages are when the tire does not slip and when it does slip.

There are three general classes of road surface to which we should give consideration in regard to their behavior under the action of wheels.

The first class, such as brick and concrete, which show comparatively little deflection under the action of rubber tires.

The second class, such as asphalt, macadam, and bituminous macadam, which show some noticeable depression under wheel action.

The third class, such as gravel, earth and sand, which show very considerable depression under wheel pressure. In other words, the surfaces are classified according to the approach of their materials toward theoretically perfect elasticity.

If we take the case of a concrete road or one of brick supported upon a concrete foundation, we have a condition closely resembling that of a beam uniformly supported from below and acted upon from above by repeated stresses. By simply making the depth of concrete sufficient the section subjected to stress will be able to sustain an almost infinite number of deflections without fracture. Consequently it would appear to be a practical impossibility to destroy an adequately constructed concrete road by rolling a loaded wheel over it.

If destruction exists, then it must be due principally to the abrasive action of the rolling body. Abrasive action being purely a function of the relative hardness and relative speed of the rubbing surfaces, it is obvious that an ordinary steel wagon tire can do much more damage than a rubber tire for the following reasons:

A concrete surface consists actually of an almost infinite number of minute particles of sand and rock which project very slightly above the cement matrix in which they are embedded. The abrasive action therefore consists in either dislodging these from their bed or in crushing them. A rubber tire clearly cannot crush these particles, for being so much softer it is merely depressed by them and dislodgement while not impossible is improbable since it would be liable to occur only when the tire has in addition to its rolling motion a slip relative to the road surface. Below the average legal limit of speed this slippage has been shown to be so small as to be almost negligible. (See deduction of Henry Southern on "Tire Slippage at Brooklands Race Track", S. A. E. data sheets.)

A steel tire in passing over projecting particles, however, has by virtue of its hardness the power to crush them. They then become powder, which is removed by wind, weather or other passing vehicles, leaving other similar particles exposed to subsequent similar action.

Let us suppose the second class of road surfaces is composed of a layer of short vertical rods fitting into sockets at their lower ends to allow oscillation in the direction of progression (see Fig. 5). The displacement of these rods as the wheel passes over them will be as follows: First, the rods ahead of the wheel are deflected in the direction of progression. Second, at some stage of the passage of the wheel the tangential component force due to the drive of the wheel becomes greater than the normal component due to the weight carried, with the result that a rod is deflected opposite to instead of in the direction of motion; thus creating or tending to create a space between it and its neighbor.

If, instead of independently acting rods, we have a surface layer composed of small crushed stones held together only by some adhesive compound, either a rup-

ture or a severe strain is certain to occur at the point of deflection reversal.

With a substance possessing theoretically perfect elasticity the amount of work necessary to produce fracture of a given section is of course a fixed quantity; and the fracture may be produced either by applying a force of great intensity for a short time or by applying a small force for a long time.

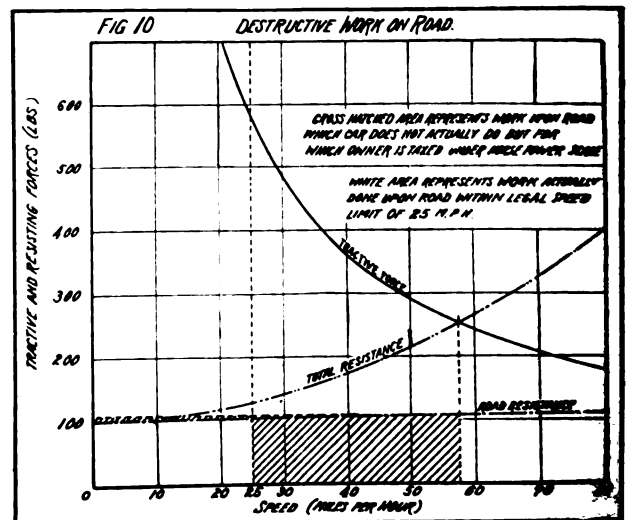
A road surface composed of macadam held together by a bituminous binder is far from possessing perfect elasticity, so that while the viscous properties of the binder may reunite the particles of stone after a strain has been produced by a slowly acting force, it is reasonably certain that a suddenly applied force will completely rupture the continuity of the binding compound.

The power to produce this rupture is then clearly a function of the velocity with which the neighboring particles are separated and hence proportional to the velocity of the vehicle.

This tendency to break the continuity of the road surface is, however, only the first stage of the destruction. The second stage is reached when the speed of the vehicle is such that there is appreciable slippage between the tire and the road surface. The particles which have become loosened by the first stage of the process or during the passage of some preceding vehicle are then actually extricated from their place in the surface by contact with the tire which then has motion relative to the road surface instead of merely rolling over it.

In the case of road surface composed of yielding material, such as sand, gravel or earth, having no extraneous material to bind its particles together, the particles subjected to pressure from a wheel are displaced until brought to rest by the friction between neighboring particles. If we assume a static condition of a wheel resting upon such material, it will resemble that shown in Fig. 6. Suppose further that the material is composed of small, nearly uniform spherical particles. As the load of a wheel is applied acting through the resultant W to one particle of the upper surface, this particle is depressed, and as it moves downward it divides the pressure between two particles beneath it. These two in turn divide the pressure between three, and this process continues downward until the pressure has been distributed among so many particles that each particle no longer has sufficient pressure upon it to produce motions in its neighbors.

In other words, a state of stable equilibrium has been reached. Of course, instead of one particle being in contact with the tire, its weight is distributed in small increments like W^1 (Fig. 6), which are resisted by uniformly distributed small increments R^1 (Fig. 6), but the process of weight distribution is essentially as described and we have formed beneath the tire a cone shaped mass. The sides of the cone make the angle B with the base,



which is, in fact, the angle of repose for the material under consideration. Such is the condition under static load.

Supposing now that we have the wheel progressing

at a considerable velocity and at the same time exerting a turning effort against the road surface, we will have a condition similar to that shown in Fig. 7. We must now deal with a resultant pressure on our hypothetical cone, the direction of which is no longer vertical, but deflected toward the rear of the moving vehicle. The pressure in question is the resultant of the combination of weight on the moving wheel with a tangential component due to the torque which produces rotation in the wheel. What we find, therefore, is that the axis of the cone is no longer vertical, but takes such an angle that the rear surface of our cone shaped mass approaches or passes a horizontal line at the road surface. As long as the cone remained with its axis vertical there was sufficient mass of particles surrounding it to prevent any upheaval, but with the inclined position some of the stressed particles in the area of disturbance are exposed. The result is that there is an actual upheaval or wave formed behind the wheel. Because of this wave there is a displacement of material from the road surface.

It should be noted here that the same power of wave formation exists in the case of a horse drawn vehicle, the only difference being in degree and direction of propagation of the wave. The horse drawn vehicle propagates its wave ahead of instead of behind it, due to the fact that the friction of the wheel hub on the axle sets up a resistance to rotation which is balanced by a force acting between the tire and the road surface.

The conclusion we may draw from the analysis, however, is that the power as well as to some extent the velocity of the vehicle is instrumental in destroying the soft type of road surface. Perhaps the most perfect engine of destruction ever devised for this class of road is the horse drawn buggy with an extremely narrow steel tire which cuts into the road surface with all the speed and effectiveness of a thin knife, leaving a rut which is augmented by succeeding vehicles with even normal tire widths. The action of tires having excessive pressure per unit of contact surface is therefore abnormal and will not be included in our analysis.

A potent factor in destruction of both soft and medium-hard roads is the action of a car as it passes rapidly around a curve. In this case the tendency of the tire to skid under the action of centrifugal force is proportional to the square of the velocity of the car and the radius of the curve upon which the car turns. The point we wish to bring out, however, in this connection is that the velocity of a vehicle is a considerable factor in the destruction of all classes of roads, and that for a given type of tire the coefficient of c will differ for each type of road.

Now that we have noted the effect of resistance to car velocity upon road surfaces, let us next look into the general relation of power to resistance. In Fig. 1 we plotted a curve which expressed the magnitude of the force set up by the air resisting the passage of a vehicle moving at various speeds. In Fig. 3 we plotted a curve which expressed the magnitude of the force set up by the road surface resisting the passage of a wheel moving at various speeds. The total resistance encountered by the car is, therefore, equal to the sum of the two individual resistances. In both Figs. 1 and 3, the scale of abscissae and ordinates was the same, so that if we wish to express graphically the magnitude of the total resistance to motion of a moving vehicle, we may do so by plotting on the same scale of co-ordinates a curve, the ordinate of which at any given speed is equal to the sum of the ordinates for each of the characteristic curves at that same speed. Fig. 8 shows such a curve. The work by which we overcome the work due to total resistance, represented by the area under the combined resistance curve (Fig. 8) is nothing else than the work delivered at the rear wheels by the motor acting through the medium of the transmission system.

Suppose that we plot upon the same system and scale of co-ordinates, a curve, the ordinate of which at any given speed is equal to the magnitude of the force propelling the aforesaid vehicle. Then assuming that our horsepower is of constant magnitude it will be represented by a curve shown in Fig. 9.

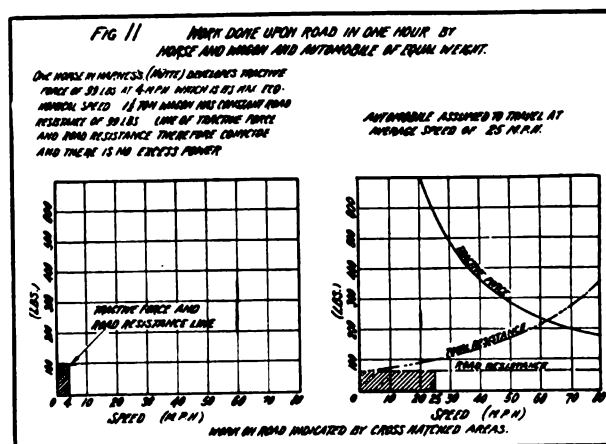
As a means of comparing this latter with our total-resistance curve, let us superpose one upon the other, keeping our base line and origin coincident as in Fig. 10. Near the point of zero velocity the ordinates of the propelling force curve are much higher than those of the total-resistance curve. The ordinates of the total-resistance curve, however, increase as we move toward the right until we finally reach a point at which the ordinate

is equal to the ordinate of the propelling force curve for that velocity.

The significance of this coincidence is that at this velocity the propelling and resisting forces are exactly in equilibrium, and that this velocity may be maintained but cannot be exceeded. If we consider a vehicle of the same mass as the one just mentioned, but impart to it a propelling force equal to only one-half that of the first body, then clearly the curve of propelling forces will intersect the curve of total-resisting forces at a point much nearer the zero velocity than was the case with the first body. Hence, maximum possible velocity is proportional to propelling force.

Should we wish now to pass from a consideration of propelling and resisting forces to a consideration of work required for propulsion and resistance, we may do so by comparing the areas under the plotted curves. From such comparison we shall see that from the point where the curves of propulsion and resistance intersect, the velocity will remain constant and its product by the ordinate at that point will be equal to the power required to maintain that velocity.

The moving vehicle which has been under consideration might be either an animal or a mechanically propelled vehicle, and still be susceptible to the same treatment, but of course the power and resistance curves would present different characteristics. As an example, Fig. 11 shows the curves for a horse drawn vehicle and a motor car. In the case of the horse drawn vehicle the only resistance which we have to overcome is the road resistance. The line representing the propelling force is



a straight line parallel to the base line and its distance above it is proportional to the number of horses pulling upon the vehicle.

Nearly every state in the Union imposes a limit upon the speed at which a vehicle may travel over its roads. An average taken of the limits in 38 states shows itself to be approximately 25 miles per hour.

In volume one of the S. A. E. data sheets is a table compiled by Mr. Churchward, giving ideal speeds in miles per hour for vehicles of various weights. A prefixed note says: "Taking everything into consideration, that is to say, life of engine, transmission, tires and maintenance of vehicle as a whole, experience has shown that the following table of economic speeds is approximately correct".

The speeds given in that table are lower than the average of the state limitations. If we consider that on our graphical representation of road resistance and tractive forces, our lines represent average relative conditions of power to road resistance, it is clear that an average automobile has a power which is sufficient to exceed the speed limits fixed either by law or by general expediency regarding life and maintenance of car. The question naturally arises at this point, therefore, why should we, as is now the general tendency, tax a man in proportion to the power of his motor when actually he must not only break the law to use the full power for which he is taxed, but also must shorten the life of his vehicle by so doing. It is quite presumable that with efficient police regulation a man cannot habitually or with impunity exceed fixed speed laws. Moreover, looking at a motor car as a pleasure vehicle, it is

doubtful if the occupants of a car derive any genuine pleasure or benefit from speeds in excess of 25 miles an hour.

Looking at the subject from all angles, then, it is very doubtful if a conservative man cares to drive his car at a higher average speed than 25 miles an hour, so that the average of road resistance which we must consider will be that encountered at that speed. But as we have previously stated, the destructive effect of a vehicle on the road at a given speed is measured by the resistance encountered at that speed; so that our measure of the destruction which a car can cause to a road will occur at the legal speed, which is 25 miles per hour.

Any road vehicle, then, should be primarily taxed in proportion to its road destructive power and hence in proportion to its road resistance at its allowable speed, and not at a speed in excess of that, even though the motor may be of sufficient horsepower to maintain a higher rate of speed.

It is not alone sufficient, however, that the vehicle should be taxed entirely in proportion to the road resistance. As is very evident, certain classes of vehicles use the roads a far greater number of hours per day, week, or month, than do other classes, and the amount of work which they do in destroying roads is directly proportional to the relative length of time during which they are in motion on the roads.

The problem of determining an average of the number of hours per day spent by each class of vehicle on the roads is somewhat difficult. In this respect we will class vehicles under the heads of commercial and pleasure vehicles. Of the commercial vehicles, omnibuses use the roads the greatest number of hours per day. If we assume that they give continuous service (365 days per year) from 6 in the morning until 9 at night, we shall be well within the actual limits of operation. This gives 15 hours per day during which they use the roads.

Motor trucks are the next in order of length of time per day, which, if we consider the average business day, will be about 10 hours. Inasmuch as there are but about 300 working days per year, allowing for Sundays and holidays, the average as compared with omnibuses and

pleasure cars will be $10 \times \frac{300}{365}$ hours, which makes a daily average of about $8\frac{1}{4}$ hours.

With pleasure cars the time factor is very indefinite. Let us assume that a man drives his car to and from his home and his place of business twice a day, and goes out for an hour's ride in the evening and spends about nine hours in his car on Sunday. The number of hours consumed in trips to and from work may be estimated at a maximum of three per day. Let us say that considering all seasons of the year, the man drives on an average one hour in the evening. Now adding in the nine hours of Sunday driving we get a total of $18 + 6 + 9 = 33$ hours per week, and an average of $4\frac{1}{4}$ hours per day.

If our assumptions have been approximately correct we must further modify our road resistance by discriminating between the different classes of vehicles, that is, omnibuses, trucks and pleasure cars in the proportion of 15, $8\frac{1}{4}$ and $4\frac{1}{4}$. That is to say, that if we regard the

tax rate for pleasure vehicles as the basic rate, the rate for trucks will be about $1\frac{1}{4}$ times the basic rate, and the rate for omnibuses will be $3\frac{1}{4}$ times the basic rate.

In justice to the road builder it would be well to establish lower limits of speed for vehicles of excessive weight per square inch of tire contact. This, in fact, has been done in some states, notably in Massachusetts and New York. At just what point these limits should be established could be determined by experimental means.

After one has scrutinized the superposed characteristic curves of power and resistance and grasped the significance of the area representing work to the right hand side of the line of 25-mile-per-hour velocity, he cannot but understand what a comparatively small portion of the average horsepower of a motor is actually used in doing destructive work on the road. And understanding this fact it would be logical to give consideration to some tax system bearing a more direct relation to road destruction than does the horsepower scale.

Such a mode of taxation would in no wise work injustice either to the state or to the vehicle user and would tax the user in proportion to the total yearly road destruction of his car at legal speed. This road destruction could be calculated by some formula which takes into account the various items of weight, wheel diameter and type of tires.

While it is not entirely within the scope of this paper to derive such a formula, we may suggest one taking the general form here shown:

$$\text{Total tax} = \frac{W \cdot oc}{r} \cdot Vm \cdot K \cdot \text{tax rate per unit.}$$

In this formula.

W represents the total weight of car.

oc = Coefficient of rolling friction.

r = $\frac{1}{2}$ tire diameter.

Vm = Legal velocity in miles per hour.

K is a factor proportional to the average number of hours per day which a given type of vehicle uses the road relative to the standard type on which the tax rate is based.

The value of oc should be determined only after a series of exhaustive experiments.

To bring out more clearly the radical differences between the two systems of taxation, let us take a practical example.

Suppose we consider a touring car and a medium-capacity truck. The monetary value of each is about the same. The touring car has a motor of the same bore, stroke and number of cylinders. The touring car has pneumatic and the truck solid tires. Under the horsepower scale both vehicles pay the same tax. If they travel over a road at the same rate of speed, however, it is hardly probable that they do the same amount of damage, and yet for this damage both must pay equally.

On the other hand, if we taxed each vehicle in proportion to the destruction each might cause to the road, each pays only for its share of the destruction.

Which system of taxation appears then to be more logical; the one based on horsepower or the one based on destructive power?

(Continued on Page 69.)

METZ DEFEATS BIG FIELD IN HILL CLIMB.

HAVING proven its efficiency in touring by winning the Glidden trophy, the Metz car, made by the Metz Company, Waltham, Mass., demonstrated its hill climbing abilities by defeating a big class of cars of 300 cubic inches and under in the second annual hill climb of the Automobile Club of Fayette County, Penn., held June 17 and 18. In this event the Metz defeated the Kline car, which won the free-for-all. When it is considered that the piston displacement of the Metz is 196 inches against 296.5 of the Kline, the performance is all the more remarkable. In

the free-for-all the Metz was second, defeating a large field of high powered machines.

The climb took place on a three-mile hill, the road rising 3007 feet in three miles, and abounding with bad turns. The maximum grade is 12 per cent. The best time was made by the Kline car, 3:57.6, with the Metz, driven by J. McCann, second, in 4:04.2. The first day's racing was for amateurs, Mercers winning two of the three races, R. C. Bigler taking the free-for-all and the \$1600 to \$3000 class event. Cash prizes amounting to more than \$5000 were offered.

GENERAL NEWS OF THE INDUSTRY.

Judge Bennett of Superior Court of Connecticut Refuses Permission to Receivers of Pope Manufacturing Company to Sell Plant, Etc., to a Syndicate.

JUDGE William L. Bennett of the Superior Court of Hartford, Conn., at a hearing held June 24, declined to authorize the sale of the Pope Manufacturing Company, now in the hands of a receiver, for the sum of \$1,800,000.

The plan submitted by a Boston syndicate provided for a payment of \$400,000 cash and the balance in five-year notes, and in making his decision Judge Bennett stated that the Connecticut courts had never allowed its receivers to indulge in financial speculation.

Immediately after Judge Bennett's decision the interested parties held a conference looking toward a basis for another offer. A representative of the Boston syndicate is stated to have told the court that it was the desire to pay enough for the Pope properties so that the merchandise creditors would be protected in full and also to pay the expense of the receivership. It was also said that a reorganization of the company was contemplated with a capital of \$2,800,000.

The 300 stockholders and 1500 or more creditors of the Pope Manufacturing Company received notices of the offer of \$1,800,000 which, if it had been accepted, would hardly pay the outstanding bills of \$1,750,000, the creditors state. The plan proposed by the syndicate was to give the preferred stockholders opportunity to subscribe for one share of stock in the new corporation for every eight shares held in the present company. Common stockholders were to receive one share of common stock for every 12 shares that they now hold, and one-half share of common with each full share subscribed for.

KRIT COMPANY PROSPEROUS.

Pays 20 Per Cent. on Outstanding Indebtedness, Making a Total of 30 in Four Months.

The Krit Motor Car Company, Detroit, has made a payment of 20 per cent. on its outstanding indebtedness, which, with a 10 per cent. payment in February, makes a total of 30 in four months. The officers of the company state that business has been at least 30 per cent. better thus far this year as compared with the corresponding period last year. The business in the

West is reported excellent, and as the crops in Oklahoma and Kansas are large, a big business is anticipated in these states. The exports of the company have grown steadily, especially in South Africa, South America and New Zealand.

NEW SPRING COMPANY.

Pallau Steel Company Organized to Manufacture Automobile and Vehicle Springs.

The Pallau Steel Company, Mt. Clemens, Mich., has been organized with a capital stock of \$75,000, of which \$60,000 has already been subscribed. The company will manufacture automobile and vehicle springs, and plans are being prepared for a factory building, 175 by 75 feet. A. J. Pallau, the promoter and vice president, has been connected with the Detroit Steel Products Company for several years. The officers of the company are: President, A. T. Donaldson; vice president, A. J. Pallau; secretary and treasurer, Clifton D. Jackson.

SETS ASSETS SALE ASIDE.

Property of Atlantic Vehicle Company Sold to Lot Bidders, a Newark Concern.

The sale of the assets of the Atlantic Vehicle Company was set aside and the bids of the lot bidders were accepted. The Boeger-Meyer Machine & Tool Company, 140 Lafayette street, Newark, N. J., purchased the good will, drawings, patterns, jigs and tools, and most of the finished parts.

PAYS DIVIDEND.

Creditors of Michigan Buggy Company Receive Another Payment and a Fourth Is Promised.

The Detroit Trust Company, receivers for the Michigan Buggy Company, has mailed the creditors of that concern a third dividend, and a fourth is promised. Deals are said to be pending for the sale of the plant and real estate.

BUYS PALMER & SINGER.

Singer Motor Company, Inc., Purchases Trade Name, Etc., and Will Supply Parts.

The Singer Motor Company, Inc., 630 Jackson avenue, Long Island City, N. Y., has purchased at a private sale the trade name, good will, patents, drawings, etc., of the Palmer & Singer Manufacturing Company, and will supply repair parts for the car of that name, also maintain a service station.

Work on the Singer Six is progressing rapidly and the first chassis is now being tested on the road. Deliveries will commence, it is stated, about July 15. It is understood that the new car will be sold with a complete equipment, including electric lighting and motor starting, and wire wheels, at a price well below \$2500.

ADDS TO SELLING FORCE.

General Sales Manager Philp of Dodge Bros. Makes New Appointments.

Dodge Bros., Detroit, is increasing its sales organization, as two more appointments have been made by General Sales Manager A. I. Philp. He has appointed H. D. Day, Boston representative, and John A. Nichols, Jr., will have charge in Seattle. Mr. Day's territory includes all of the New England states with the exception of Connecticut. He is not only well known in the automobile industry, but among business men. Mr. Nichols was formerly a newspaper man and has been identified with the industry as a superintendent of branches, also in an advertising capacity.

PLAN CYCLECAR TAXICABS.

Twombly Taxicab Company Organized to Carry Passengers for 25 Cents the First Mile.

The Twombly Taxicab Company has been organized in the State of New York with a capitalization of \$500,000, to carry passengers for 25 cents the first mile and five cents a quarter-mile thereafter. A radical feature of the enterprise is a clause in the selling contract which provides for the above named rates.

The company is planned by W. Irving Twombly, New York City, who is the builder of the Twombly cyclecar. He is vice president and general manager of the new company. D. Stuart

Dodge of Phelps, Dodge & Co., New York City, is president. It is stated that these two men control this company, as well as the Twombly. The founder of the concern states that 1000 have been spoken for in New York City, Philadelphia and Boston, and that this number will be built in the factory at Nutley, N. J., between Oct. 1 and Feb. 1. The first cabs will be completed shortly and it is stated that one has been built.

The cab will have a 44-inch tread, 92-inch wheelbase, four-cylinder, water-cooled motor, bore of 2.75 inches and stroke of four; improved landaulet body and provision for carrying baggage.

WILL MAKE SMALL CARS.

Malcolm Cyclecar Company to Manufacture a Machine of That Name.

The Malcolm Cyclecar Company has been organized to build a car of that name and it is announced that the plant, which is located in Plymouth, Mich., 18 miles from Detroit, will be in operation within 10 days. The list of stockholders includes such well known Detroit business men as Homer McGraw and H. Jay Hayes. The directors of the company are as follows: Charles H. Bennett, vice president and manager of the Daisy Manufacturing Company; B. B. Bennett, general manager of the Bennett Manufacturing Company; C. H. Lawrence, E. Malcolm Jones and C. A. Fisher. E. Malcolm Jones will be retained as general manager and C. H. Lawrence as sales manager. C. A. Fisher is treasurer.

WINNERS USED RAYFIELD.

Living up to its reputation for thorough-going efficiency, the Rayfield carburetor aided two winners at the recent Uniontown, Penn., hill climbing contest. The Kline, which won the free-for-all, and the Buick, winner in the 300-459 cubic inches piston displacement class, were both Rayfield equipped.

One of the Features of the Eighth Annual Touring Number of The Automobile Journal to be published July 10, is that each of the itineraries listed is prepared with a view to connecting all sections of the country, so that it is possible to start from any given point and arrive at any given destination in the United States or Canada, utilizing the routings presented.

SHANKS WITH PREMIER.**Former Winton Man to Direct Sales and Advertising for Indianapolis Concern.**

Announcement is made by the Premier Motor Manufacturing Company, Indianapolis, Ind., of the appointment of Charles B. Shanks as director of sales and advertising. He assumed his new duties June 15. The status of Sales Manager Macey and Advertising Manager Bieling is not to be affected in any manner by the change, it is stated.

Mr. Shanks is one of the pioneers of the industry, having been connected with it, largely in the sales and advertising department, since the days of the single-cylinder machines. For nearly 10 years he was sales and advertising manager for the Winton Company in Cleveland, O., a position which he resigned to become business manager of the Class Journal Publishing Company, New York City.

POPE-HARTFORD'S FUTURE.**Receiver Asks Permission to Continue the Business for Another Three Months.**

In his petition for the approval of the semi-annual report presented by Col. George Pope, receiver for the Pope Manufacturing Company, Hartford, Conn., to Judge Bennett of the superior court, request was made to be allowed to continue the business of the company for another three months period, dating from June 22. It is expected that, unless the stockholders or creditors have been able to present some favorable plan for reorganization involving the purchase of the plants as a whole, before the expiration of the additional three months, the receiver will be obliged to recommend the cessation of manufacturing operations and forced liquidation.

Referring the court to schedules on file, the receiver holds that there will be but one question as to the future conduct of the business on which there can be any difference of opinion. All the product now in course of manufacture must be completed and sold, excepting possibly 150 model 35 cars, which are not yet in finished parts. The receiver recommends that the manufacture of these cars be pushed as rapidly as possible.

The schedule shows that there is on hand parts and material valued at \$22,217 expressly suitable for 150 cars of the model 35 type, this being a four-cylinder machine. How much of the raw material, finished parts, supplies, etc.,

valued at \$168,038.13, can be used in the completion of these 150 cars is problematical. A considerable part can be used thus, turning an item which cannot be profitably sold in its present state into marketable merchandise.

A comparative statement of assets shown by the receiver's inventory of Oct. 27, 1913, and an inventory of the receiver's books as of April 30, 1914, is made, showing \$1,853,438.66 on the first date and \$1,905,469.13 on the latter.

TWO RECEIVERS APPOINTED.**Randall-Faichney Company of Boston Is in Temporary Financial Difficulty.**

Judge Dodge of the United States district court in Boston has appointed Charles P. Blinn, Jr., vice president of the National Union Bank of that city, and Benton Whidden of Brookline, Mass., receivers for the Randall-Faichney Company of Boston, and Watertown, N. Y. The concern is well known in the industry as manufacturer of accessories, but also produces a line of druggists' supplies, etc. The receivers are ordered to furnish a joint bond of \$50,000.

The petition for the appointment of receivers was brought by the Cutter & Wood Supply Company of New Jersey, one of the creditors. Inasmuch as the schedule shows liabilities of \$282,000 and assets of about \$400,000, it is not thought that the trouble will prove of more than temporary character.

KNOX MOTORS AFFAIRS.**Court Decision Opens Way for the Establishment of Its Sales Organization.**

A decision has just been handed down by Judge Morton in the United States district court for Massachusetts which definitely settles all question as to the transfer of the old Knox Automobile Company, Springfield, Mass., to the new Knox Motors Company of that city. The sale of the entire plant and property of the old company to E. O. Sutton, who is now treasurer of the new concern, has been confirmed by the court. Pending this confirmation, tentative plans for the conduct and wide extension of the Knox business had been formed and were partially under way, but with the receipt of news that the sale had been confirmed, execution of these plans was begun with a rush.

H. G. Fisk, treasurer of the Fisk Rubber Company, Chicopee Falls, and one of the best known

men in the industry, already had been elected president of the Knox Motors Company. Announcement is now made of the advancement of Charles F. Barrett to become advertising manager. George M. Davis, who was with the Pierce-Arrow Motor Car Company, Buffalo, N. Y., for four years, and more recently with the Packard interests in Albany, has become assistant sales manager.

The Knox Motors Company already had the nucleus of a dealers' organization through branches in New York, Boston, Chicago and Kansas City, and these will be continued and their organization not only will be enlarged, but their scope increased widely. Applications have been received from a number of high grade dealers for allotments of territory, and it would appear that the opportunity to handle Knox-Martin tractors was a great incentive to dealers.

The production department had partially completed the thorough systematizing of the factory and the effect of Judge Morton's decision is to make possible the unification of the entire Knox organization, both producing and selling, in a way that has not been practicable heretofore. The latest Knox touring cars were coming through the factory at the time, and added impetus was given to their production. Orders also have been issued for quantity production in Knox-Martin tractors and fire apparatus.

AMERICAN EFFICIENCY SURVEY.

More About the Purposes of the Organization Which Will Test Motor Car Units.

President Harry Newman of the American Efficiency Survey of Motor Car Units, Chicago, Ill., explains the purposes of that organization in the following manner:

It is our purpose to have the 70 odd units of importance in the list of motor car construction parts put through the scientific laboratories which have been placed at our disposal by Purdue University, Lafayette, Ind., to get what we think is the greatest hall mark that scientific men could give and to make known to the world the findings of the reliable men of the best equipped laboratories in the world. Already the board of engineers has made its findings on one important adjunct of the motor industry, and it is conducting the most exhaustive tests imaginable in another phase.

Honesty and truth, stamped with the Purdue University laboratory hall mark, will be sufficient guarantee for the American Efficiency Survey of Motor Car Units; it will be accepted, will this verdict of the scientific men, by the makers of the motor car units, as a badge of honor among the captains of industry. There will be weight behind the report of this survey, and the exploitation of the manufacturers who "pass highest" in this rigid test will be the subsequent pleasure of the officials of the survey.

In my opinion this is the greatest step that has been made to establish independent, disinterested standards in the automobile industry which, in point of capital in-

vested, is second in this country, being surpassed only by the steel industry.

The board of engineers includes the following: C. H. Benjamin, D. Eng., dean of the engineering schools at Purdue; Louis E. Endsley, M. E., professor of railway mechanical engineering—in charge of the Master Car Builders' Association tests; M. J. Golden, M. E., director of the mechanical engineering laboratories; Robert G. Pilkington, M. E., resident engineer, who has had years of experience in the largest concerns of the motor car industry, and C. Francis Harding, B. S., E. E. These men will direct some of the most exacting and strenuous tests of motor parts, tires, oils, etc., the engineering world has ever known.

GOODYEAR AND THE DEALERS.

Meetings Held Periodically in Order to Bring Out Merits and Service Given by Company.

Surprising results are accompanying a series of car and tire dealers' meetings which the Goodyear Tire & Rubber Company is conducting in the various principal cities. The Goodyear Company, having proved in the practise of its own sales policies that a remarkably successful tire business can be conducted on a standardized merchandising basis, has been interesting dealers in the development of standards in at least a part of their own business. The meetings are held in behalf of better merchandising and have not been merely occasions for the exclusive exploitation of Goodyear. The company takes the view that as fast as dealers declare themselves for certain standards, all tire companies must come into line; tire manufacturers, car makers, dealers and the consuming public will alike be benefited and the whole industry encouraged.

The Goodyear Company believes its tires now represent the lowest possible cost a mile to the user, and that standard making should be followed by standard selling. The company declares for the dealer, for its distribution. It has no proposition for the jobber or middleman, and is also discontinuing retail business at its branches to give the dealers a clean field.

Adjustments are also simplified. Defective tires will be adjusted more liberally than ever before. This, it is figured, will also finally help the consumer, by reducing the price he must pay and educating him to obtain maximum mileage through proper tire care. Everywhere dealers are indorsing these and a number of other Goodyear policies, which, no doubt, will be of great benefit to the trade and consuming public alike.

NEW ACCESSORIES FOR THE MOTORIST.

WALTZ AUTO SEMAPHORE.

A Combined Tail Light and Illuminated License Number.

The Irwin-Waltz Interests, City Hotel building, Ellwood City, Penn., is manufacturing the Waltz Auto



semaphore, which differs from the usual types of devices designed to signal the direction, etc., to be taken by the car. The Waltz is a combined tail light and illuminated license number and comprises a case having three compartments, each of which is fitted with an electric bulb.

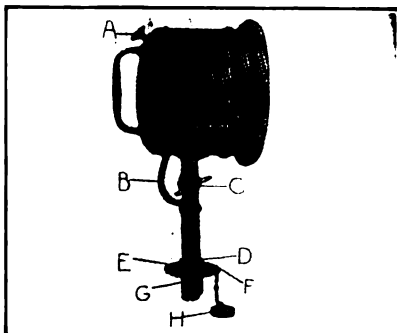
The case is covered with a celluloid plate bearing the license number in the shaft of a double headed arrow which is set in an opaque background. The heads of the arrow rest on separate compartments of the case and are illuminated when desired by means of two push buttons located convenient to the driver. A dashboard switch operates the license number. The current supply may be the electrical equipment of the machine or a set of dry cells, etc.

CELLO SEARCHLIGHT.

Wireless Design Operated by Push Button with Dry Cells.

The A. S. Campbell Company, 284 Commercial street, Boston, is manufacturing the Cello Wire-Less searchlight. As the name implies the construction is without wires, to prevent opportunity of short circuits, and the design makes for easy and rapid installation. The light is equipped with the same reflector as is used in high grade lamps.

The connection to the batteries is made through a highly polished flush deck socket, and when the light is not in service, a cap screwed on to the deck socket makes a water proof fitting. The push button A operates the lamp, and pressing down obtains a flash, while a half-turn gives a steady illumination. The flexible cable is in-



dicated by B, and C is the hinge joint obtaining movement.

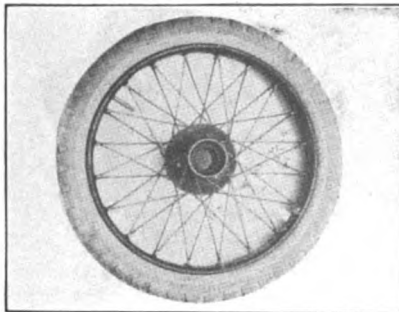
The deck swivel is locked by a nut D. E is the bronze contact spring and F the deck socket, which connects to the main wiring below. The self-cleaning, positive contact is shown at G. H is the cap screw utilized when the lamp is not in service.

The design is very sturdy and can be set at any convenient angle. It is stated that ordinary type can be read at a distance of 1000 feet and that the lamp will operate economically on six dry cells. It is adapted for service with a storage battery or dynamo, and the bulb is an eight candle-power six-volt member. The finishes are: Brass, bright nickel and black nickel.

CAMERON WIRE WHEEL.

Ford Design Installed Without Any Alterations.

The Cameron Wire Wheel Company, 47 Adelaide street, Detroit, is marketing a wire wheel for the model T Ford car. One of the qualities of the design is that it is interchangeable with the regular wood wheels



fitted to the Ford machine. The Cameron construction is also detachable, and is designed to carry 30 by 3.5-inch tires.

The wire wheel is securely locked by means of special studs, these taking the place of the old bolts used in the wooden members. The locking studs are operated by a socket wrench, much in the same manner as the demountable types of rims. As the original brake drums are not interfered with there is no change to the brake adjustment, etc.

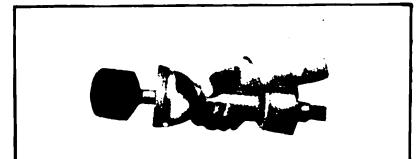
One of the features emphasized by the maker is the lacing of the spokes, it being held that they will not catch in ruts, and that at the same time they afford ample resistance to torque and lateral stresses. The wheels are finished to withstand weather, being first copper plated, then given two coats of black enamel. The Ford design comes in sets of five. The company also manufactures wire wheels for standard cars.

Equipment and supplies for the motor car will be featured in the Eighth Annual Touring Number of The Automobile Journal, July 10.

WIZARD WASHER.

Hands Are Not Wet and Design Is Stated to Be Very Efficient.

The Century Foundry Company, 1620 North Carolina street, Syracuse, N. Y., is marketing the Wizard wash-



er, designed to enable the owner and others to wash the machine without the usual equipment of rubber boots, aprons, etc. One of the qualities of the washer is that the hands do not come in contact with the water.

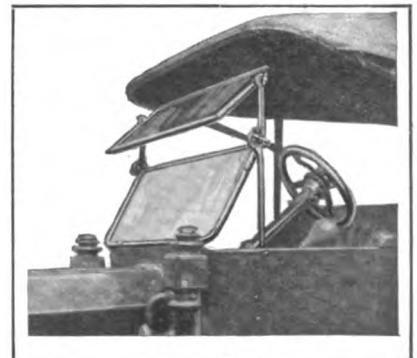
The Wizard consists of a special nozzle, a ball bearing turbine motor, a 14-inch extension and two interchangeable brushes, one long and pointed for washing corners, etc., and the other shaped like a sponge for flat surfaces. The nozzle throws a hollow film of water completely around the rapidly rotating brush, and it is stated that it removes all deposits without injury to fine finishes.

BANKER WINDSHIELD DEVICE.

Permits Adjustment of Ford Shield and Provides Ventilation.

The Banker Windshield Company, Ellsworth and Negley avenue, Pittsburgh, Penn., is manufacturing a device for windshields for the Ford car and machines of similar size. The design is particularly intended to provide a clear vision when driving in a rain or snow storm, when the view is more or less obstructed.

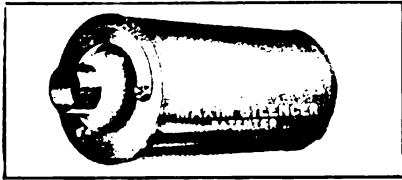
The attachment permits of adjusting the top half of the shield, it replacing the usual hinges, and the maker states that any owner can fit the design without trouble and in a short time. As will be noted by the accompanying illustration, the shield may be set at an angle and the adjustment can be made as desired.



MAXIM FORD MUFFLER.

Embodies Same Principle as the Fire-arm Silencer.

The Maxim Silencer Company, Hartford, Conn., maker of the well known Maxim gun silencer, has



brought out a design of muffler for the model T Ford car in which is embodied the same principles as those incorporated in the device used on firearms. The design differs radically from the usual type of muffler.

The exhaust gases enter the Maxim muffler at the expansion chamber, then pass to the whirl chambers, a feature of the Maxim silencer. These are formed by three segments of sheet steel separated from each other at the joints, so as to obtain a circumferential discharge. The next chamber is made in a similar manner and has discharge spaces pointing in an opposite direction, thus obtaining the whirl referred to. The noise wave is thus divided and subdivided and is gradually dissipated. The silencer comes with brackets to fit car and includes a tall pipe for clearing rear spring. Its dimensions differ from the Ford muffler only in diameter, being 5.75 inches.

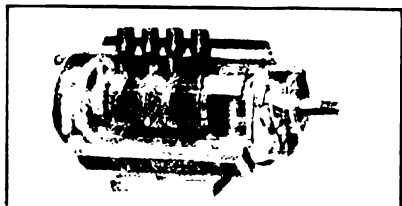
HIBBARD MAGNETO.

A Novel Design Differing Radically from Usual Practice.

The Grip Nut Company, Chicago, is marketing the Hibbard magneto, presenting several interesting features which differ from conventional practice. It is of the true high-tension type, operates at half engine speed with four-cycle motors, and has two armatures, each containing its own primary and secondary winding. It is of the four-pole type, four straight bar magnets being employed instead of the horseshoe design.

It is stated that almost any degree of advance or retard may be obtained, the change in the spark occurrence being accomplished by shifting the armatures and not the field or breaker box, as is used in present constructions. Another innovation is that the distributor is located inside the magneto, and the entire so-named distributor board revolves.

The breaker mechanism carried at the end, consists of four stationary cams, for the four-cylinder type, and



they are made of fibre. Each point of the interrupter is carried on a separate strip of metal and the two are held together by the pressure of a spring. The shifting of the armature is accomplished by a slot in the shaft, a sleeve and a spool. A pin attached to the spool is moved backward or forward.

CHANEY HEADLIGHT DIMMER.

Practical Design for Eliminating Glare of Electric Lamps.

One of the latest devices for eliminating the dazzling effects of the electric headlights is the Chaney automobile incandescent lamp dimmer, manufactured by the L. F. Chaney Company, Springfield, O. The design is simple, very compact, and may be installed easily by the owner without a knowledge of electricity, as the wiring is very simple, there being but the connections shown in the illustration.

One of the qualities of the design is that the lights may be regulated to meet all requirements. The dimmer is mounted on the dash and being equipped with a kick type of lever, the driver can move the last



named member to each of the four positions provided.

Placing the lever to "Low" effectually dims the lights, eliminating all glare. Medium and high positions are included, also an "Out". The installation of the Chaney dimmer is made easily. Three small holes are bored in the dash to retain the front plate and dimmer and a fourth opening for the shaft member, to which the handle or lever is attached. Being of the flush dash type, the design does not detract from the appearance of the car.

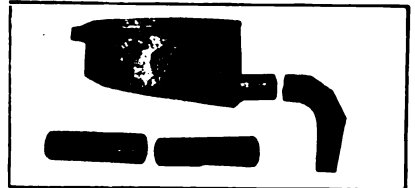
SIGNALLING DEVICES.

Noticable among the new accessories of the season are signalling devices, many of which are designed to relieve the driver of the trouble of manually warning a vehicle approaching in the direction the car is travelling that he is to stop or make a turn. Some of the devices provide a day and night signal, but the majority are designed to be illuminated at night and for service where the traffic is heavy. Generally the license number is illuminated or provision made for lighting the number plate.

METALCRAFT FUNNEL.

Has Offset and Two Extensions and Two Filters for Fuel.

William Vogel & Bros., 47 South Ninth street, Brooklyn, N. Y., is manufacturing the Metalcraft offset fun-



nel, one of the qualities of which is that filler caps not accessible with ordinary funnels may be reached easily. The design is particularly adaptable to special types of cars having fuel tanks not easily reached.

As will be noted by the accompanying illustration, the Metalcraft funnel is provided with two sectional spout extensions, these being seven inches long, also an offset elbow, which when coupled with the other members gives an extension some 20 inches long, sufficient to reach the filler of any rear tank of the pressure type.

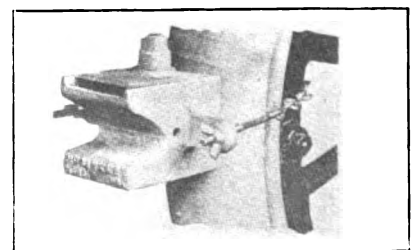
The design is constructed of seamed sheet iron with locked seams, and is galvanized.

NURINKLE VULCANIZERS.

Proper Temperature is Automatically Regulated.

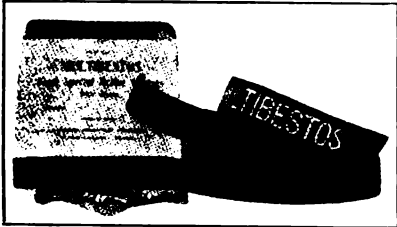
Among the manufacturers specializing in vulcanizing equipments for the private owner is R. E. Stevenson, Muncie, Ind., who is marketing a design termed the Nurinkle. It is constructed for motorists who undertake the maintenance of their tires and inner tubes, and who are not familiar with the operation of vulcanizing. The Nurinkle is of the portable type, very compact, and the maker states that the instructions are so simple that anyone can obtain perfect results with this design.

It employs gasoline as a fuel, and one of the qualities of the construction is that too large a supply of fuel cannot be utilized, as a cup integral with the vulcanizer prevents this mistake. The amount is held to be such as to provide sufficient heat to maintain a correct steam pressure, and to keep the vulcanizer at a uniform and proper temperature to effect a repair. One of the qualities of the design is that the flame is turned away from the tire without the use of a separate deflector.



MULTIBESTOS BRAKE LINING.**Special Weave Eliminating Brass Wire and Cut to Size.**

The Standard Woven Fabric Company, Framingham, Mass., maker of the well known Multibestos brake



lining, is marketing the Multibestos Ford special, a brake lining which is held to meet every condition of service on the Ford car.

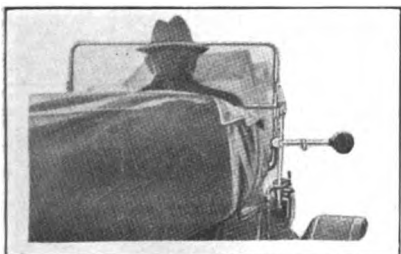
It is similar in weave and appearance to the standard material, but differs in that the interwoven brass wire is eliminated. As the lining operates in a bath of oil in the Ford machine, it is treated by a special process with a composition that renders it oil proof.

Multibestos Ford special comes in neat pasteboard boxes, each containing a complete set of linings, three in number, these being 23.5 inches long, 1.125 wide and .15625 thick. Brass rivets are enclosed for attaching the linings. The straight lining and rivets will be sold separately if desired.

COLUMBUS TRAFFIC SIGNAL.**A Day and Night Signal Operated by Pedal and with Red Light.**

Edward S. Adams & Co., Columbus, O., is manufacturing the Columbus traffic signal, which presents a number of interesting features, among which is that it is of service in the daytime as well as night. As will be noted by an accompanying illustration the signal is in the form of a disc attached to an arm which, when raised as indicated, denotes that the machine is about to make a right hand turn.

There are two of these signals, one on either side of the windshield to which they are attached, and each disc is raised independently of the other by pressing a pedal convenient to the driver. Normally the arm bearing the signal is in a vertical position, but upon wishing to signal the traffic officer or a machine approaching in the rear, the pedal is touched with the foot, raising the arm. The signal is finished in red,

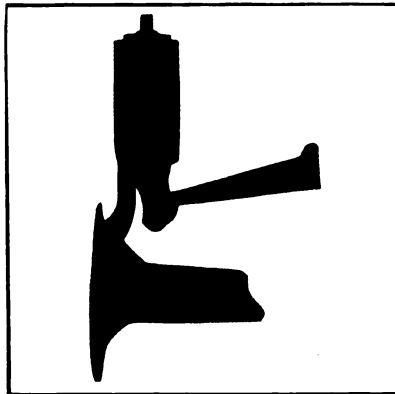


and at night is illuminated by an electric bulb, current for which is supplied by a set of six dry cells. A switch is included for cutting off the current supply in the day time.

J. M. SHOCK ABSORBER.**New Design Termed No. 3 for the Model T Ford Automobile.**

The J. M. Shock Absorber Company, Inc., 210 South 17th street, Philadelphia, maker of the well known J. M. shock absorber, has brought out a new design, termed the type No. 3, for the model T Ford car. It is based on the same helical spring principle and the same high grade material and workmanship for which the products of this concern are noted is incorporated. The maker calls especial attention to the sliding sleeve container, the automatic oiling attachments, and the adaptability of the design to the Ford machine.

The hanger is a high grade steel drop forging with rigid attachment for insertion and great strength is emphasized in the construction. The interior of the hanger contains a bronze bushing and at a point where the wear is concentrated. This part may be replaced for a very slight cost, doubling the service of the ab-



sorber. The new J. M. type comes in pairs for the rear springs, but front members are supplied. They are moderately priced. That illustrated is a rear design.

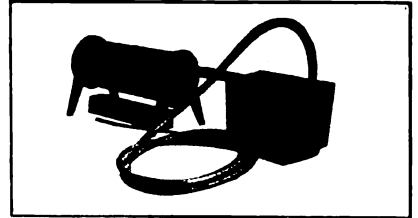
MOTOR STARTERS.

The editor of this department wishes to acknowledge several letters from readers inquiring as to the practicability of lighting dynamos and electric motor starters for the model T Ford car. Several have complained of experiencing considerable difficulty in starting the engine and wish to know if a motor starter will overcome the trouble.

The electric and mechanical types of motor starters rotate the crankshaft of the engine much faster than by the manual method, especially when the motor is given a quarter turn. The spinning of the crankshaft generally results in the engine responding, as considerably more fuel is drawn from the jet of the carburetor. The practicability of the starters has been demonstrated in service, and there is a wide variety offered.

PROGRESSIVE DECARBONIZER.**Employs Oxygen and Includes Rechargeable Generator.**

The Progressive Manufacturing Company, Reading, Penn., is introducing a popular priced oxygen car-



bon removing equipment which is designed for the small garage and the owner. It consists of an oxygen generator, which is held to be easily operated and which may be utilized indefinitely when refilled with the proper dry chemicals.

One of the qualities of the equipment is stated to be the use of non-poisonous material. Another feature is that the gas is always at low pressure, which eliminates the need of reducing valves. The outfit comes complete with sufficient material for cleaning a large motor, and the usual flexible hose is provided. Extra charges may be obtained at a nominal cost. The principle is similar to the conventional decarbonizing equipments.

SECURITY TIRE ENAMEL.**A Rubber Compound for Protecting Shoes from Weather.**

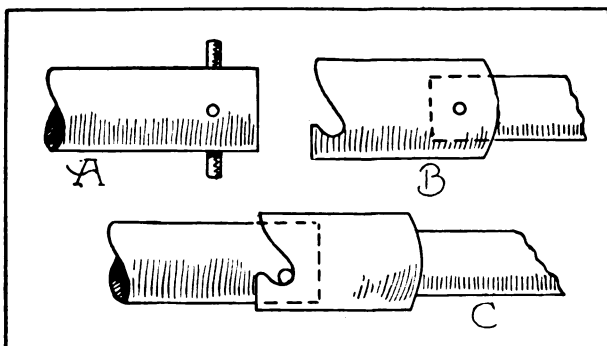
Security tire enamel is manufactured by the Security Reliner Company, Montgomery, N. Y., for which the D. Henry Bonner Company, Cambridge, Mass., is New England distributor. It is a specially prepared liquid paint made from a pure rubber combined with selected pigments, and is stated to be quick drying.

The preparation is made for protecting and preserving tires, mats and other rubber articles exposed to the action of the weather, and when applied to a casing dries rapidly, imparting a beautiful gray appearance. It is applied with a soft brush after the shoes have been cleaned, and it is stated that it spreads perfectly, leaving no brush marks. The maker claims that it will fill cuts, preventing moisture penetrating to the fabric, etc. Security tire enamel comes in press top cans, having capacities ranging from one-half pint to a gallon. It is moderately priced.



COOLING DEVICE FOR OLD MOTORS.

THE internal combustion motor is held to be most efficient when a certain temperature is attained, beyond which there is a loss of



Simple Form of Starting Ratchet: A, Pin in Crankshaft; B, Ratchet Fitted to Starting Crank; C, the Components in Place.

power. The cooling system of the modern automobile is so efficient that the water will not unduly heat, even if the motor be run idle for some time.

This does not hold true of some old engines, particularly those of early vintage. While much of the overheating is due to the imperfect circulation of the cooling fluid, caused by worn pumps and deposits in the water jackets and radiator, the design of the motor is sometimes to blame.

The writer can recall several makes of cars which could not be run idle for any great length of time without the water boiling, and this trouble was experienced when the cars were being driven, especially on a warm day.

An owner who possessed a car built in 1907, a model equipped with a four-cylinder motor, was troubled by overheating despite numerous attempts to remedy the trouble. The third and fourth cylinders were the chief offenders, and after much careful study the motorist, who was of an observing nature, adopted the plan shown in an accompanying illustration.

As will be noted it is an adaptation of the funnel or ventilator used on vessels. It was constructed of sheet brass rolled into shape, riveted, and fitted to the hood between the third and fourth cylinders. The lower part of the ventilator was provided with a lip for attachment and secured by machine screws and lock nuts.

The owner states that the device was a success; that a considerable draught of air was deflected onto the cylinders. It was found, however, that in rainy weather more or less water

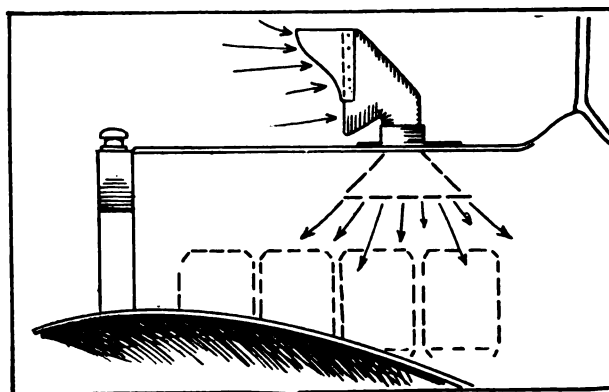
was carried to the motor. This trouble was remedied, it is stated, by fitting a lip to the top of the ventilator as shown.

STARTING CRANK TROUBLES.

The starting crank seldom gives trouble, but after long service the bushing forming the bearing becomes worn, creating play which causes trouble if the design be of the jaw clutch type. With these it is important that the clutch of the crankshaft and that on the starting handle align. When the bearing of the latter becomes badly worn the jaw members will slip, and, if the trouble is not corrected, difficulty will be experienced in starting the motor.

A method of eliminating the trouble is shown in an accompanying illustration. It consists of displacing both jaw members, and drilling and fitting a substantial pin to the extension of the crankshaft. It is a good plan to secure the larger pin, as shown at A. The clutch member is depicted at B. This is made from steel and slotted as shown, two being provided, diametrically opposite. The starting handle is fitted to the clutch and pinned, but in attaching it should be so fitted that the motor will be turned over past the ignition point before the handle attains a vertical position. This is important.

The clutch in position on the crankshaft is shown at C. It will be seen that the slotted member grips the pin, but upon the motor starting the pin will push the clutch out of engagement. The



Ventilator Made by Motorist to Prevent Overheating of Third and Fourth Cylinders.

cost of making the clutch, etc., is not great, and it is decidedly more satisfactory than the one previously referred to.

SOUTH AFRICAN MOTORING SITUATION.

Reasons Why American Cars Are Making Such an Appreciable Gain Among the Importations--Overlands, Cadillacs and Chevrolet in Alpine Tour.

AT THE 12th annual banquet of the Royal Automobile Club of South Africa, held recently in Cape Town, it was demonstrated that there were something over 7000 motorists in the South African Union, who drive their own cars. This figure was determined by the amount paid in taxes, each motorist driving his own machine being required to pay a tax of 20 shillings. Previous to March 1, £14,000 had been paid, and since that time it is estimated that between £3000 and £4000 has been collected. Since this money must be expended upon roads, it follows that there is at present something like \$90,000 available for this purpose.

Another interesting development at the banquet was the remarkable manner in which American made machines have established themselves in the South African market. In 1912, for instance, the percentage of British cars was 54, and that of American makes, 33. Last year the importations of cars had increased from about \$2,800,000 to \$5,500,000, but the British makes had fallen to 48 per cent., while American cars had risen to 40.

The reason for this condition was explained by one of the speakers, who held that it was because the American manufacturers specialized on one particular size and make of machine and were able to turn them out in enormous quantities. He said that the British manufacturer was just beginning to awaken to the fact that what was wanted was not a highly finished product, but something serviceable for general use.

A factor that is expected to work to the decided benefit of those doing an automobile business in South Africa, is the discovery of a new process for extracting motor fuel from shale coal. It is stated that it is now possible to extract 20 to 30 gallons of fuel from a ton of the coal, instead of five to six as formerly.

AMERICAN CARS IN ALPINE TOUR.

Three Overland, Three Cadillacs and a Chevrolet in Big Austrian Event.

No less than seven American made cars are competing in this year's Alpine tour of the

Royal Automobile Club of Austria. Seventy-four cars left Vienna June 14 on the 1700-mile tour of the Alpine roads in that country, and were due to return June 23. It will be some few days before definite results will be learned in America.

The seven American machines are: Chevrolet 16, entered by Karl Strakosch; Overland 43, A. H. Neukirchen; Cadillac 45, 46 and 47, F. S. Bennett, Ltd.; Overland 60, Arnold von Bessel; Overland 62, Willys-Overland Company, Ltd. The other countries represented by machines are: Great Britain, Germany, Belgium, Italy, France and Austria.

NEW EIGHT-CYLINDER CAR.

Hillman Utilizes Two Four-Cylinder Engines, Driving Separately to Rear Axle.

While complete details have not reached this country, it is understood that a new eight-cylinder car has made its appearance in Great Britain, having been given its initial trials on the Brooklands track last month. This machine is a Hillman, utilizing two four-cylinder engines, with bore of 60 mm and stroke of 120 mm (2.36 by 4.72 inches), working side by side and transmitting power by separate shafts to the rear axle. In its original trials it developed speeds averaging about 70 miles an hour, although it is expected to do much better than this.

At the same time Hornsted, in his big Benz, made one lap of the Brooklands track from a standing start in 1:38.07, a speed of 101.57 miles an hour, which is said to be the fastest it has ever been done. He also secured a new record for 10 laps, which he covered in 15:23.83, or at a speed of 107.82 miles an hour, lowering the 90 horsepower record held by a Napier and the class J mark held by a Lorraine-Dietrich.

AMERICAN CARS RULED OUT.

Empire Touring Model Cannot Win, Although It Finishes with a Perfect Score.

Rules governing automobile reliability tours in Australia are to be revised as the result of the

perfect score performance of an American made Empire car in the recent New South Wales run. Driven by C. B. Bradley of Sydney, the Indianapolis touring car made the entire trip without repair or adjustment of any kind, being one of six to finish out of the 12 which started. This condition was so manifestly unfair that protests came not only from the American, but also other competitors. One of the Sydney papers took up the matter editorially, as follows:

Amongst the five cars to complete with full points for reliability was C. B. Bradley's Empire, which ran from start to finish without stopping her road wheels for any cause whatever. Considering it was the only American car to finish with full points for reliability, and that the placed cars cost nearly three times more than the Empire, it speaks well for the cheaper car, more especially as it ran with full touring equipments, including erect windscreen. It is, of course, generally understood that under the existing formula American cars have no possible chance of winning, and there is at present a movement on foot to add a special section in future competitions for American cars. The first trial will be held about August.

NEW RECORD IN TARGA FLORIO RACE.

DRIVING the same S. C. A. T. car with which Snipe won the Targa Florio race in 1912, Ceirano won the annual Sicilian road race, May 24-25, covering the 1050 kilometers (655 miles) in 16:51:31, a new record for the course. The best previous time was 19:18:40, made by Nazarro in a Nazarro car in 1913. The prize winners this year were:

Car	Driver	Time
S. C. A. T.	Ceirano	16:51:31
De Vecchi	Gloria	18:41:30
Fiat	Lopez	19:45:26
S. C. A. T.	Colombo	19:45:53
Nazarro	Cortese	19:58:11
Elka	Lucca	19:58:52

It will be noted that all the cars to finish with in the money were of Italian make. There were 34 entrants, 31 of which started. France was represented by a Renault, De Dion-Bouton, De Dietrich and Peugeot; Germany by a Benz and America by a Ford.

The Targa Florio race was instituted in 1906 by Vincenzo Florio, and has been run each year under the original rules. The course covers practically the entire island, starting and ending at Palermo. No portion of the road is covered a second time, and the surface is not specially prepared in any way. Drivers are required to be constantly on the lookout for obstructions, since no portion of the course is patrolled for the event.

The winning car is a 30 horsepower machine. The four-cylinder motor has bore of 100 mm and stroke of 150 mm (3.9 by 5.9 inches). The winning driver is the son of Designer Ceirano of the S. C. A. T. factory, and a relative of the Ceiranos identified with the Itala and S. P. A. companies.

OLD BOARD RE-ELECTED.

Same Officers Will Serve the Boston Automobile Dealers' Association Next Year.

At the annual meeting of the Boston Automobile Dealers' Association, held early in the

month, the old board of officers was re-elected as follows: President, J. H. MacAlman, Stearns-Knight; vice president, J. S. Hathaway, White; treasurer, F. A. Hinchcliffe, Winton; secretary and general manager, Chester I. Campbell; directors, J. W. Bowman, Stevens-Duryea; J. W. Maguire, Pierce-Arrow; E. A. Gilmore, Chalmers; C. P. Rockwell, Jeffery; F. E. Wing, Marmion; C. E. Fay, Ford; F. A. Hinchcliffe, J. S. Hathaway and J. H. MacAlman.

ST. LOUIS GETS CONVENTION.

Federation of American Motorcyclists Will Meet in That City July 15-18.

The board of directors of the Federation of American Motorcyclists has decided upon St. Louis, Mo., as the convention seat for this year's national assembly. The event will take place July 15-18, and delegates will be present from every section of the country.

Aside from the business session, the convention will be of interest from the fact that the national championship races will be held on the excellent dirt track, under the auspices of the St. Louis Motorcycle Club. Several tours to the convention are now being arranged. One of these will start from Chicago, another from San Francisco, and still others from intermediate points in the East, South and West.

According to the Bosch Magneto Company, New York City, every one of the prize winners in the Prince Henry flight of May 17 to 24, inclusive, was equipped with Bosch magnetos and spark plugs.

Rene Thomas, winner of the 500-mile Indianapolis speedway race, has been driving a Cole car, the use of which was tendered to him by the Cole Motor Car Company of Indianapolis, Ind., since the race.

FEATURES OF TONELYTE LIGHTING SYSTEM.

AN ENGLISH lightning dynamo which employs a principle similar to that formerly utilized by an American manufacturer, for con-

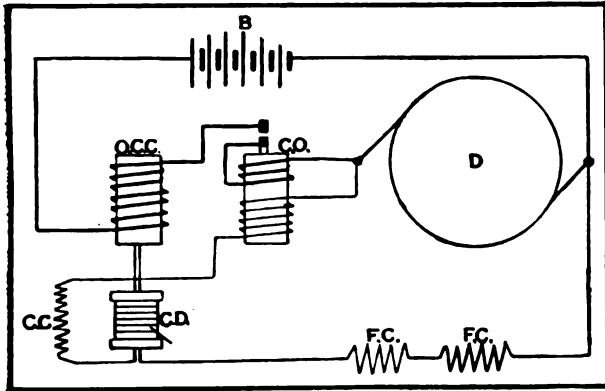


Fig. 1—Wiring Diagram of Tonelyte Electric Lighting System.

trol, but differing slightly in its details, is the Tonelyte, a description of which appears in a current issue of the Autocar. The illustration at Fig. 2 shows the regulator and automatic cut-out, which are carried separately from the dynamo in a case.

It will be noted that the device comprises two metal cylinders mounted on a plate, at the centre of which are a number of thin carbon discs placed between two copper blocks. Inside of each cylinder is an iron drum or core carrying a winding. The cylinder shown at the right in the illustration regulates the output of the generator. An iron core carries a single winding of wire, which forms part of the main circuit from the dynamo to the battery. When a current is passed through this wire a magnetic field is brought into being, the effect of which is to cause the iron core to endeavor to take up a position exactly in the centre of the iron cylinder. Normally, the core is held somewhat above the central position, since the lever projecting below rests against a long pivoted lever, the free end of which is pressed upward by a spring controlled button.

When the current flows, however, the core pushes its way down, compressing the spring and moving the pivoted lever. This lever carries nearer to its pivoted end a spindle connected with the lower of the copper blocks in the controlling device. Upon a downward movement of the drum, caused by the passage of a strong current, the pressure holding the discs together is partially released.

When the discs are pressed together the current will flow through them with little or no resistance, but upon the plates being separated the resistance is increased. This is the principle employed for controlling the output of the dynamo.

The iron cylinder on the left in the illustration at Fig. 2 also contains a similar core, but it carries two windings and performs the function of a cut-out. When the core moves downward against the coil spring it forces two substantial silver contacts against one another, completing the main circuit.

The operation of the system is made clear in the diagram at Fig. 1. The primary winding passes around the cut-out core, across the contact points and then around the output control core, thence to the battery. The field circuit passes around the cut-out core, and then reaches a point where two optional paths are offered. One of these leads through a choking coil C C and the other is through the carbon discs C D. When the pressure between the discs is considerable, an easy path is provided for the current, but when the pressure is reduced the resistance to the current is increased to a great extent, and consequently the strength of the dynamo field is decreased, and the output of the generator prevented from rising above that determined by the maker.

The dynamo may be classified as one including an electro-magnetic cut-out and with a regulation of output by means of resistance in the field circuit, as previously explained.

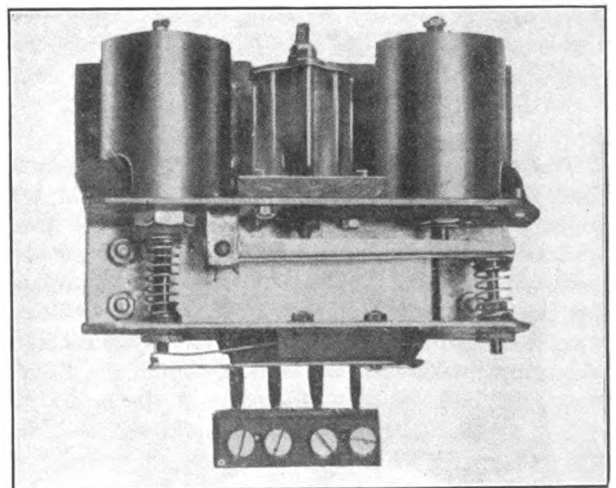


Fig. 2—Tonelyte Regulator and Cut-Out—The Former Utilizes Carbon Discs to Set up Resistance.

VALUE OF DAILY INSPECTION OF CAR.

AFTER the new car has been driven for a few days it is an excellent plan to go over the chassis components and tighten any nut or bolt that may be loose. Some of these will stand a slight taking up, especially if the machine has been operated over rough thoroughfares.

The motorist who makes it a rule to go over the chassis very carefully at least once a week, and who gives the more important components, the steering linkage and brakes, for example, attention, is insuring his machine against road troubles.

CARE OF FANS.

With the arrival of hot weather the owner will do well to examine the fan belt to see if the tension is correct. If covered with lubricant it is advisable to remove it and clean with gasoline, and if the belt is laced or the ends secured by metal couplings, these should be examined for wear. The belt should be so adjusted that it will not slip, but not so tightly that it will impose undesirable stresses upon the fan bearings. The grease cups should be turned down and the supply of lubricant renewed.

Sometimes the cause of the motor heating is due to the fan blades being bent from their original position. They should be inspected and if any are out of line, bent to conform with the others. Watch carefully for loose bearings, especially if the fan is mounted on the radiator and its blades rotate close to the fins. Too much play in the bearings may result in the blades striking the radiator, and this would ruin the cooler in a very short time.

CHANGE WATER IN RADIATOR.

Manufacturers of radiators recommend changing the water in the cooling system at frequent intervals. In the warm weather the fluid becomes more or less heated and if hard deposits a scale in the fins of the cooler, impairing its efficiency. Remove the water at least once a week, flush out the radiator with clean, and renew with rain water if possible.

TIRE HINTS.

This is the time of the year when the motorist who has been operating his car during the

cold weather begins to experience tire trouble unless new shoes have been fitted after the overhaul. Frequently the cause of the blow-out is water which has worked in through an apparently minor cut in the tread, and reaching the fabric has rotted it.

It is a good plan to remove the casings and inspect their interiors. Discolored spots indicate that moisture has penetrated the walls and that deterioration has begun. The walls should be firm and hard, and when they yield easily to pressure, it indicates that the plies of fabric have become separated.

Back up these weak places with a good grade of fabric and cement the material to the casing, and be careful to eliminate wrinkles in the work. If in doubt as to the condition of the casing, take it to the expert for his opinion. While it is admitted that it is not a pleasant task to remove one or more tires, it should be borne in mind that it is more easily accomplished in the garage than on the road. Many times several hundred miles are added to the life of an old shoe by backing up weak places.

Cuts, large and small, should not be neglected. They allow dirt to work in between the rubber and the fabric, forming what is known as a sand blister, and if neglected the tread will separate from the carcass. Portable vulcanizers are inexpensive, easily operated, and permit of repairing a cut without removing the shoe from the wheel. There are several preparations on the market for mending cuts which are practical, provided the instructions of the maker are followed.

AIR LEAKS IN INTAKE.

Many times hard starting and missing on low motor speeds is caused by improperly fitting gaskets between the intake manifold and cylinders or carburetor flanges. A simple method of testing for air leaks is to use cylinder oil, covering the suspected part with the lubricant while the motor is operating. If the oil is drawn in it will indicate a leak.

The fit of the spark plugs and exhaust connections is best tested with the motor cold. Make a soapsuds and place it on the suspected parts, and turn the motor over slowly. If any leaks exist they will be indicated by the bubbles given off. This method is valuable in locating leaks in the pressure fuel feed system.

ZIP IS NOW IN LIGHT CAR DIVISION.

DURING the past few weeks there has been a noticeable tendency on the part of the pioneer American cyclecar manufacturers to take their machines out of the true cyclecar class, by fitting four-cylinder motors of sufficient bore and stroke dimensions to place them in the light car division. The Zip Cyclecar Company of Davenport, Ia., is one of the latest to make an announcement of this nature.

In the future, Zip machines will be equipped with a four-cylinder, water-cooled motor, with bore of 2.5 inches and stroke of four, giving a piston displacement of 78.6 cubic inches. The weight also has been increased slightly, and is now 800 pounds. This has been brought about as the result of redesigning the body, although the wheelbase remains at 92 inches and the tread at 40.

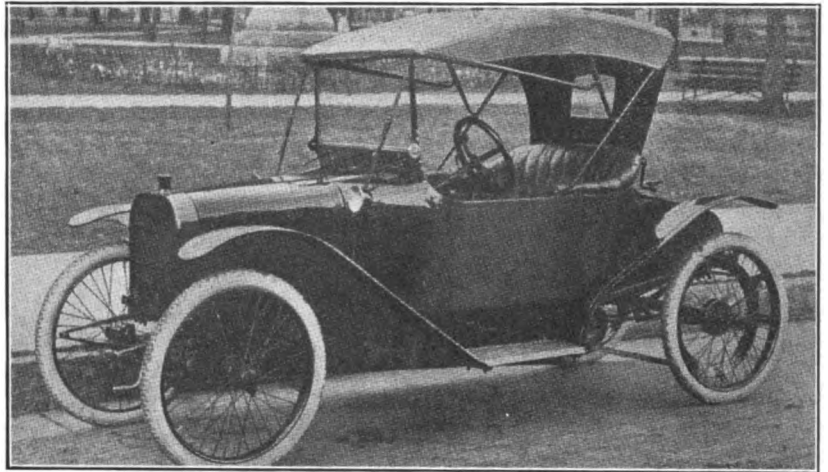
The new motor is of the L head type, with the valves on the right side housed with aluminum cover plates. The valves are 1.125 inches in diameter with opening of .1875 inch, the spur toothed timing gears running in a bath of oil. The crankshaft is of high carbon steel, heat treated, and the connecting rods I section, drop forged. The camshaft is one-piece, drop forged carbon steel, bone hardened and ground. The crankshaft bearings are heavy duty babbitt. The cylinder head is removable, as well as the lower half of the crankcase, giving ready accessibility. Cooling is by thermo-syphon; lubrication by splash, circulated by pump; ignition is by magneto, and the carburetor is a Kingston.

Transmission is by friction disc, 12 inches in diameter, mounted on New Departure ball bearings, and floating free on the sleeve, pressure being applied by pedal. The spur wheel is 13 inches in diameter, with hard fibre filler face, 1.25 inches, and bevel edges. This is mounted on a 1.5-inch ball bearing shaft. Extra large pulley wheels are fitted to the jackshaft for operating the belt drive, which is of the original design, short belts running over large pulleys to give maximum contact. Belts are six-ply, extra heavy.

The frame is channel section, pressed steel, 2.5 inches deep, having three cross members, re-

inforced by eight gussets and two motor cradles, which are bolted with two bolts to each cradle on either side of the frame. Full elliptic springs are used both front and rear, these being 26 inches long with three-inch spring action in front and four-inch in the rear. Both axles are of I beam section, the front one with steering knuckles forged in one piece, mounted on case hardened pins having a bearing on case hardened washers.

Clutch and brake pedals are of the ratchet type, set wide apart. The service brakes are of the expanding type, operating on six-inch drums on the rear wheels. The brake shoes have 1.125-



The New Zip, with Four-Cylinder Motor, Now in Light Car Division.

inch face and are lined with Raybestos. The emergency brake operates on the transmission reverse. Wheels are of wire, carrying 28 by 2.5-inch tires, the hubs being fitted with ball bearings.

The body is of the fore door roadster type, seating side-by-side, with the driver at the left. The seat is 37 inches wide, 17 deep, and the back is 18 inches high. Ample leg room is afforded, the distance from the seat back to the dash being 52 inches. A luggage compartment is provided at the rear. The equipment consists of a top, dust hood, full set of curtains, folding glass windshield, electric headlights and tail light, six-volt, 40 ampere-hour storage battery, electric horn, tools, repair kit, jack, etc.

It may be stated that the increased demand for Zip machines has made necessary the enlargement of the factory, so that the plant now occupies a brick building of five stories.

CORRESPONDENCE WITH THE READER.

Premier Water Trap—Curious, Portland, Ore.

I read recently that the Premier automobile uses a water trap to strain the fuel. How is it constructed and how does it differ from strainers used on cars?

The water trap referred to is used on the series M Premier car, made by the Premier Motor Manufacturing Company, Indianapolis, Ind. It is a filter or strainer, and its function is to prevent water or foreign substances reaching the carburetor.

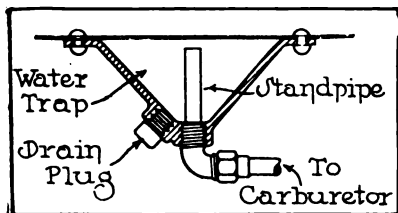


Fig. 1—Water Trap Used on Premier Cars.

The construction is shown at Fig. 1 and the device is attached to the bottom of the fuel tank. Water is prevented from flowing with the fuel to the carburetor by a standpipe extending vertically as shown in the drawing. Water, being heavier than gasoline, settles in the bottom of the trap and is removed by displacing a drain plug.

Eureka Generator—Reader, Liberty Mills, Ind.

Having read an account of lighting generators for small cars in your valuable book on page 66 of the May 10 issue, I would like to be informed as to the mounting of the Eureka, Jr., for a model T Ford car, as I note that the Ford company states in one of its books that the current from the Ford generator should be used only for ignition.

The generator referred to is manufactured by the Henricks Novelty Company, Indianapolis, Ind., expressly for the small car, and is adaptable to the Ford automobile. The company supplies the necessary brackets, bolts, pulleys, etc., for a small sum, and the installation of the dynamo does not require any alterations as the brackets are made to fit accurately. The equipment for mounting the generator is shown at Fig. 2, the parts disassembled being depicted at A and fitted to the motor at B.

To install, the radiator is removed, also the Ford fan bracket. The latter is replaced by the Henricks bracket marked Ford B and the pulley Ford C attached by four screws to the regular fan pulley on the side next to the motor. The generator bracket A is secured as shown at B, on the left hand side of the engine, new bolts being utilized. The dynamo is secured to the bracket by means of two cap screws, and lock washers are utilized. Drive is by belt in the installation illustrated, and it will be noted that

the extra pulley does not interfere with the conventional member. The attaching can be done by the owner as, as has been previously stated, there is no fitting or alteration.

Maxwell Model E—R. E. D., Brooklyn, N. Y.

Being a subscriber to The Automobile Journal, would like to ask a few questions through your correspondence column.

1—Will you show me in plain figures how the horsepower of a 4.25-inch square motor is figured according to the A. L. A. M. or S. A. E. ratings as applied to New York State?

2—In my model E 1910 Maxwell car I find a little end play in the wristpin and connecting rod bearings. Would this cause a knock in the engine or cause any irregular running? How much play should there be, if any, and what is the method of adjustment?

3—Will you show me the method of timing the valves on this same engine, according to the marks on the fly-wheel?

4—What is the method and force required to remove and replace the rear wheels of this car?

5—What effect would a defective tube coil have on the engine?

6—Can you tell me if there is any law in New York City requiring a permit to keep your automobile on your own premises? The owner has already paid a fee for a license to run his car and now it seems he must pay another for the privilege of keeping the same car on his own premises, which is double taxation and therefore would seem unconstitutional. I would like to have your opinion on this point.

Thank you in advance and trust that I will not take up too much of your valuable space and time.

1—The A. L. A. M. and S. A. E. rating referred to is the same, and it is utilized in New York State for computing the horsepower of a motor. It is based on an assumed piston speed of 1000 feet a minute and considers the bore only. The formula consists of squaring the bore, multiplying the result by the number of cylinders and dividing by 2.5. For example: The bore mentioned in the question is 4.25. To figure the horsepower, square the bore (4.25×4.25), which equals 18.0625, which multiplied by the number

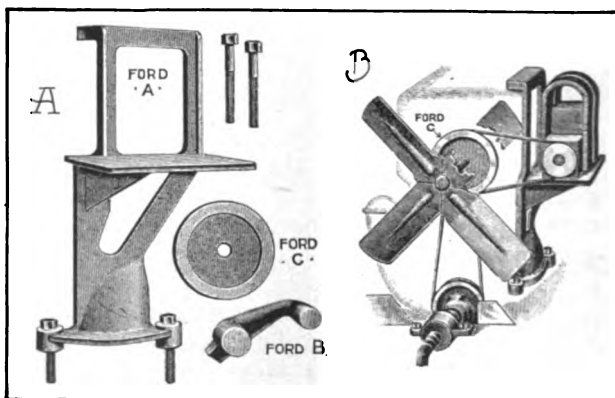


Fig. 2—Mounting Eureka, Jr., Lighting Generator on Ford Motors: A, Bracket, Pulley and Fan Bracket; B, the Equipment in Place.

of cylinders, four, becomes 72.25, which divided by 2.5 gives 28.9, the horsepower rating.

2—If the writer remembers correctly the wristpins of the motor referred to oscillate in the piston bosses and if worn and loose are likely to cause a knock. The bushings may be renewed provided the wristpin is not worn too badly. If not familiar with the work it is best to consult an expert. There should not be any play in the connecting rod bearings. A loose connecting rod will cause a knock. Adjustment is provided by removing shims from the bearing caps. The scraping in and adjusting of these bearings require experience if satisfactory results are to be obtained. A loose wristpin or connecting rod should not cause any irregular operation of the motor, but play should be removed, as damage may result.

3—The valve timing of the engine may be checked up by utilizing the flywheel marks referred to. The method was described and illustrated in the April 25 issue. The marks refer to the opening and closing points of the valves, also the dead centres, figures and letters being used. For example: I O 1-4, denotes the opening points of the first or fourth cylinder, and I C 1-4, their closing points. Similarly E O and E C denote the opening and closing points respectively of the exhaust members.

The method of utilization of these points is simple. Rotate the flywheel in its normal direction until the mark I O 1-4 comes opposite the centre of the last cylinder or the indicating mark. With the marks registering, the inlet valve of the first or fourth cylinder should begin to lift. If not, the adjusting nut of the tappet is loosened and the tappet mechanism lengthened until the valve stem just begins to raise. The closing point is checked in a similar manner. After resetting the valves and locking the nuts, it is a good plan to check the opening and closing points a second time. If it be borne in mind that the crankshaft of the motor makes two complete revolutions to complete the four strokes, the timing will be made much easier, as the valve action may be checked upon each half revolution of the crankshaft. It will be necessary to know the firing order of the motor, however.

4—The rear wheels are fitted to a taper axle and locked by a nut and cotter pin. Sometimes the wheels can be removed easily. It may be necessary to employ a wheel puller.

5—A defective tube transformer coil would cause irregular operation of the motor.

6—Other than the fire department regulations, the writer knows of no ordinance or law

requiring the owner of a motor vehicle to pay a fee or take out a permit to store a private machine on the premises.

Timing Haynes Motor—Information, Bridgeport, Conn.

Can you give me the timing diagram of the 1912 Haynes motor, or the proper clearance between the valve lifter and valve stem?

The timing of the Haynes models 21 and 22, 1912 and 1913 motors, is as follows: Intake opens five degrees after top dead centre and closes 32 degrees after lower dead centre. Exhaust opens 47 degrees before lower dead centre and closes two degrees after top dead centre. The clearance between the valve lifter and valve stem should be .006 inch. The better method of setting the valves would be to observe the timing

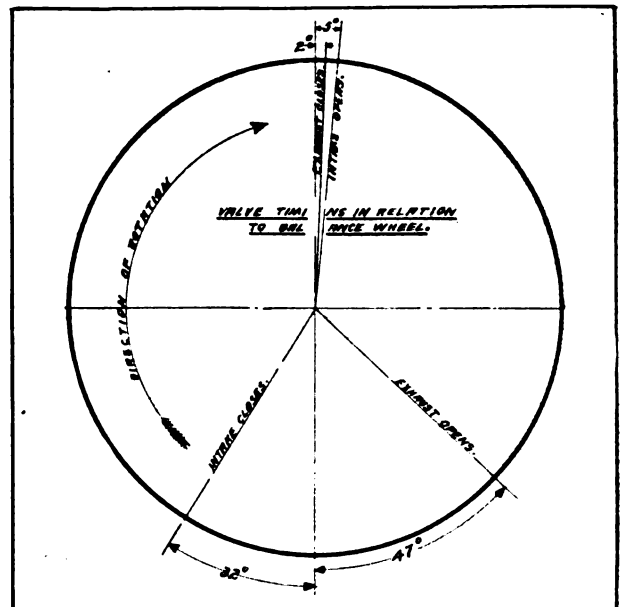


Fig. 3—Timing Diagram of Models 21 and 22, 1912 and 1913 Haynes Motors.

as given above and shown by the diagram presented at Fig. 3.

Wristpin Design—Reader, Peoria, Ill.

I have a knock in my 1912 Haynes motor. The repairman says it is loose wristpins. How are they fitted and if badly worn what would I have to do?

The wristpin used in the motor mentioned is of the fixed type and is retained by a split ring very similar to a piston ring, the ends of the pin being slotted to take the ring. If the pins are worn oval it will be best to fit new ones, and to scrape in the connecting rod bearing, as this will doubtless be found out of true.

Timing Magneto—Reader, Everett, Mass.

Am informed that you published a drawing showing how to figure out the lead of magneto for motors of dif-

ferent sizes. Being a new subscriber, would appreciate your publishing the information.

The timing diagram referred to is shown at Fig. 4 and was compiled by the Bosch Magneto Company, New York City. With this it is a simple matter to determine the angularity of the crankthrow from vertical, providing the stroke and piston travel in inches are known.

As to timing: The magneto is generally installed so that the contact points of the interrupter mechanism open at a certain point, corresponding to a predetermined angularity of the crankthrow from vertical, the relation of the pis-

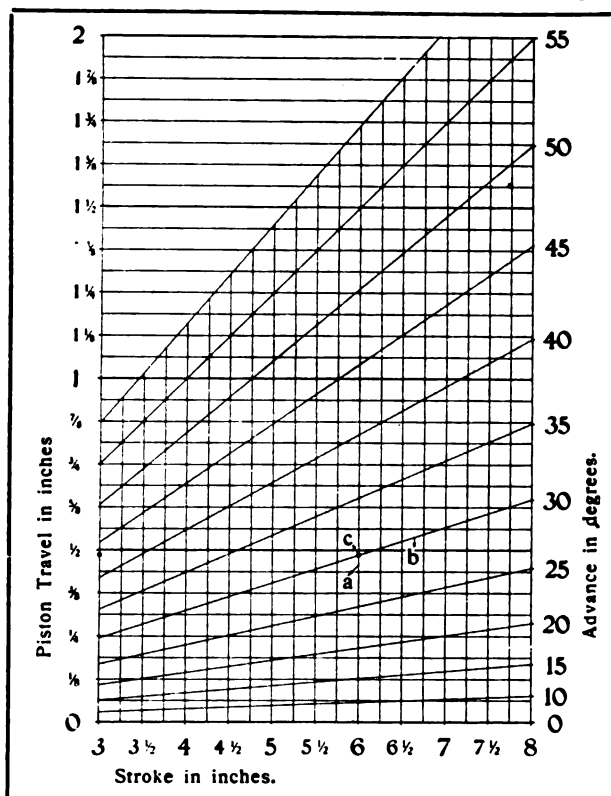


Fig. 4—Bosch Timing Diagram for Ascertain the Angularity of the Crankthrow from Vertical When the Stroke and Piston Travel Are Known.

ton travel to the rotation of the crankshaft depending upon the stroke and the length of the connecting rod.

While it is a comparatively simple matter to ascertain the piston travel in inches, it is not so easy, however, to determine accurately the rotation of the crankshaft, and the timing diagram referred to will save lengthy computations. In it the relation between the piston travel and the connecting rod length is 1:4.5. The vertical lines numbered at the bottom give the stroke of the motor in inches, the rotation of the crankshaft in degrees being indicated by the slanting lines

and the figures at the right. The figures on the left and the horizontal lines indicate the piston travel in inches.

To illustrate the use of the diagram: Let it be assumed that it is desired to find the piston travel for an advance of 30 degrees on a motor having a six-inch stroke. The vertical line for the desired stroke may be identified by the figures at the bottom of the diagram, and this vertical line followed until it cuts the diagonal line indicating the desired number of degrees, which is 30 in the present case. The horizontal line nearest this point is followed to the left, and in the illustration it will be noted that it indicates about .5 inch.

Consequently in setting a magneto on an engine having a stroke of six inches, it will only be necessary to insert a wire in the opening of the petcock of the proper cylinder, the first, for example, and turn the flywheel backward past dead centre until the piston has descended about .5 inch. This will correspond approximately to a rotation of 30 degrees of the crankshaft.

Studebaker Horsepower—H. E. R., Viroqua, Wis.

Can you give me, or near, the horsepower of the 1914 Studebaker Four? I have purchased one of these and it gives good satisfaction. As the factory does not give the rating this year I would like to know it if possible.

The Studebaker Four has a bore of 3.5 inches and stroke of five, and according to the S. A. E. formula, which considers bore only, is rated at 19.60 horsepower, and has a piston displacement of 192.4 cubic inches. This rating is very conservative and the writer understands that it has been greatly exceeded in dynamometer tests to which all Studebaker motors are subjected.

Emergency Light—A. H. Mohr, Arcadia, Ia.

Please give me a little information on attaching an electric emergency light to the storage battery. I have a No. 79 model Overland.

By an emergency light it is presumed that a trouble or inspection is referred to. There are several methods of making a connection such as to one of the lamps, cutting in on a circuit or wiring from the battery. It would be best to consult the agent from whom the car was purchased as to the proper bulb to use and method of connection. This information will be supplied by the factory upon addressing the service department.

One of the feature articles of the annual touring number of The Automobile Journal will be complete instructions for the remedying of ignition troubles.

PUBLICITY MAN EVOLVES NEW SCHEME.

THERE is little reason to question the statement that the automobile industry has been responsible for a large number of schemes for directing the attention of the public to a given product. Publicity managers have vied with each other in their efforts to secure something new and original, until it would almost seem that the field had been entirely covered. It remained for the H. J. Koehler S. G. Company of New York City, distributor for Koehler trucks and Grant passenger vehicles, to devise what appears a decidedly new application of a principle that is somewhat well known.

An accompanying illustration shows a Koehler wagon in front of the National History Museum in New York City, with a Grant roadster mounted thereon and a young woman seated in the roadster, apparently guiding its movement. The camera fails to do complete justice to the scheme evolved by the publicity man.

On the chassis of the delivery wagon has been installed a special platform with skirts that drop a considerable depth for its full length. Between this platform and the chassis rollers are fitted, these being coupled by gearing, so that when the roadster's engine is started the moving rear wheels drive the rollers underneath, and these in turn move the forward rollers and wheels at the same speed. The high speed ratio is employed and the effect is that of the roadster moving on the deck of the wagon. In addition, power from the rollers turns signs mounted in the skirts of the platform.

It may be that the idea was suggested from the fact that the company was requested to provide a float to lead the annual actors' parade. At least the combination made its first appearance on the streets at that time, with Miss Stella Mayhew at the wheel of the Grant car, which was

painted white. Of course the advertising feature was not so marked as it was made later. Patents have been applied for by V. V. Kranich, who was responsible for much of the design.

MAKERS ELECT OFFICERS.

Col. Clifton Again Heads the National Automobile Chamber of Commerce.

Col. Charles Clifton, treasurer of the Pierce-Arrow Motor Car Company, Buffalo, N. Y., for eight years at the head of the national motor car



Novel Method of Displaying Grant Car, Mounted so as to Move on Rollers Fitted to Koehler Delivery Wagon Chassis.

manufacturer's organization, was re-elected president of the National Automobile Chamber of Commerce at its annual meeting in New York City early in the month. The other officers are:

Vice president, Wilfred C. Leland, Cadillac Motor Car Company, Detroit; second vice presidents, Hugh Chalmers, Chalmers Motor Company, Detroit, gasoline division; Windsor T. White, White Company, Cleveland, O., commercial vehicle division; H. H. Rice, Waverley Company, Indianapolis, Ind., electric division; secretary, R. D. Chaplin, Hudson Motor Car Company, Detroit; treasurer, Col. George Pope, Pope Manufacturing Company, Hartford, Conn.; general manager, Alfred Reeves, New York City.

Board of directors, the officers and S. T. Davis, Locomobile Company of America, Bridgeport, Conn.; C. C. Hanch, Nordyke & Marmon Company, Indianapolis, Ind.; Alvan Macauley, Packard Motor Car Company, Detroit; W. E. Metzger, American Electric Car Company, Chicago; H. O. Smith, Premier Motor Manufacturing Company, Indianapolis; Albert L. Pope, Pope Manufacturing Company, Hartford, Conn.; L. H. Kittredge, Peerless Motor Car Company, Cleveland, O.; John N. Willys, Willys-Overland Company, Toledo, O.; E. R. Benson, Studebaker Corporation, Detroit.



THE INDIANAPOLIS RACE.

In analyzing the results of the fourth annual international sweepstakes 500-mile race, it is necessary to start with the proposition that the French machines won because they were the best cars. There has been no attempt, however, on the part of the French manufacturers, or, for that matter, the makers of any of the foreign machines competing in that event, to mislead the American public into the supposition that these cars were the stock product of the concerns whose name they bore. There simply has been a difference of opinion between the manufacturer in this country and abroad as to the value of speed contests from a strictly scientific viewpoint.

The speedway management has announced a programme for the immediate future which, upon first consideration, possesses elements of impossibility. However, there is food for thought in the suggestion that the American position with regard to racing must undergo a radical change. While foreign cars have been competing with machines of home production practically ever since the inception of the industry in this coun-

try, it is only within the past two years—or, more properly speaking, during the last two 500-mile races—that the real modern racing creations of foreign manufacturers have been sent to the United States.

For a number of years there has been disposition on the part of European motoring prints to scoff at the so-called stock car event. It is also true that, as soon as America practically dropped the stock car contest, Great Britain inaugurated the standard car event, which is different largely in name only. But Great Britain, in keeping with Continental Europe, has not abandoned the special racing creation.

There is a wide difference between the freak, composed of standard products, put together for racing purposes, and the specially built racing machine. One has no other object than to win a prize, while the other is designed and constructed to demonstrate some particular theory which is expected to have practical value to the industry. The results of the last 500-mile race indicate somewhat conclusively that Europe has progressed much further along this line of endeavor than America, albeit, for the first time, there was some evidence that American manufacturers and designers are giving thought to this feature in speed contest work.

RESULT OF BUSINESS METHODS.

In view of the conditions which have prevailed during the past fiscal year—for, measured by the production “season”, the automobile year virtually comes to an end July 1—the fact that many concerns were practically sold out a month ago indicates in no uncertain manner the stability of the motor car industry. There is little doubt, however, that the application of business principles has played an important part in the success thus manifested. There is still much room for improvement, but it will be less difficult to maintain the newer methods once they are firmly established.

Automobiles must be sold today, with strong emphasis on the “sold”. Business principles must permeate every department of the business. Those concerns—manufacturer or dealer—which recognize this fact cannot help but reap the benefits accruing to the successful business man. And, after all, the purchasing public likes to do business in a businesslike way.

PIERCE-ARROW 1915 LINE ANNOUNCED.

IN KEEPING with its policy to build the best all around motor car possible, to price it on a basis of fair profit, and to add each year such additional equipment as has demonstrated its real worth, the Pierce-Arrow Motor Car Company, Buffalo, N. Y., announces that its series Three automobiles will be sold at the same prices as the series Two.

The series Three will be built in three sizes. The 66 horsepower chassis will be known as the 66 A-3, the 48 horsepower as the 48 B-3, and the 38 horsepower as the 38 C-3. The bore and stroke of the motors is as follows: 66 A-3, five-inch bore, seven-inch stroke; 48 B-3, 4.5-inch bore, 5.5-inch stroke; 38 C-3, four-inch bore, 5.5-inch stroke.

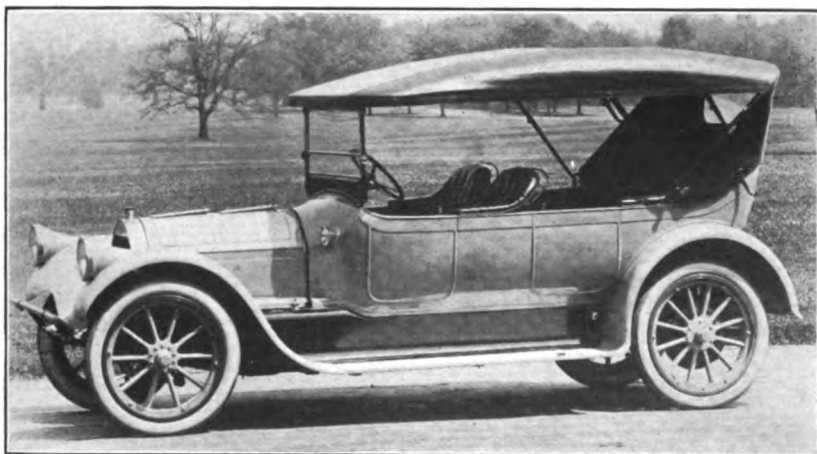
In general appearance the cars differ materially from the previous designs. Without reducing the road clearance it has been found possible to lower the bodies and running boards of all models by increasing the drop of the central portion of the frame. This change has led to the adoption of pressure feed and placing the fuel tank at the rear of the chassis. An advantage of the change is the placing of the carburetor much higher, and it is more accessible.

Many improvements have been made, which lighten the labors of the driver. The accelerator, throttle and spark controls have been simplified, and the electric motor starter is now operated by a push button, no pedal being necessary. Instead of the plug for locking the ignition, a Yale lock and removable key are provided. It is stated that it is practically impossible to start the motor if the hood be locked and the key displaced from the switch. The action of the engine primer has been greatly simplified, and the housing of the universal joint between the clutch and transmission made more complete.

All three motors are six-cylinder, four-cycle, water-cooled units, with the cylinders cast in pairs and with mechanically operated, interchangeable inlet and exhaust valves located on opposite sides. The company holds that this arrangement obtains a shorter and lighter motor, larger valve openings without abnormal lifts,

more even distribution of weight and more accurate cam setting. Following the Pierce-Arrow practise of many years, all crankshafts are provided with seven bearings. The timing gears are of helical design.

Lubrication is by pressure feed to the crankshaft and connecting rod bearings, timing gears and to the upper portion of the cylinder walls. Two absolutely independent ignition systems are fitted. Cooling is by a centrifugal pump with large radiator. The carburetor is of special Pierce-Arrow design and manufacture. The single wire system is employed for the electric lighting and starting systems, separate units. The battery is of ample capacity, is suspended to



Pierce-Arrow Model 38 C-3, of the New Series Three, Having New Design Fenders, Lower Suspension of Body, and with Pressure Fuel Feed Replacing Gravity.

the chassis frame, and is very accessible.

The clutch is of the cone type, leather faced with flat springs to provide easy engagement. An oil ring, attached to the flywheel, maintains the clutch facing in a most efficient condition. The gearset is of the four-speed type, and has an interlocking device between it and the clutch to prevent damage through careless operation. A dust proof double universal joint is interposed between the clutch and the gearset. The service of the power tire pump is obtained by means of a claw clutch engaging with the countershaft of the transmission.

The drive shaft has two large universal joints, as well as a sliding member at the rear to compensate for spring action. A torque rod with a spring cushioned and swivelling front support and pivoted rear connection cares for all tor-

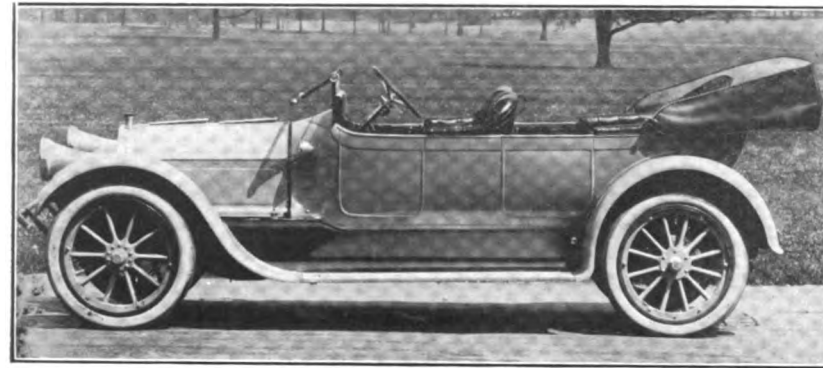
sional reactions. The rear axle is of the semi-floating type and, although very sturdy, is light. Its light "unsprung" weight is held to be re-

dividual front seats, arranged with a space between them to give easy passage from the front to the rear compartment. This enables the driver or passenger in the front seat to leave the car on either side as desired. The undivided type of front seat will be provided, if specified, at no extra cost. All cars are right hand drive and right hand control.

The steps of the touring cars are illuminated by two electric lamps in the back of the front seats, and the tail lamp and license illuminator are a unit. The fuel tank is well protected from injury by a bumper construction. The headlights are carried on the front fenders as in the series Two, and have been changed slightly to conform to the new fenders.

Entirely new bodies are offered. The standard brougham, landaulet, suburban and landau have rounded corners and domed roofs. The lines are noticeable for their simplicity and general beauty. The optional flat roofed broughams and suburbans have roofs with slightly rounded corners and they dip slightly toward the front of the car. The brougham, landaulet and suburban landaulet have unusually wide windows and are built with flat roofs. All standard dome roof designs have arched doors. All standard and optional flat roof bodies are without the arched doors.

With few exceptions all Pierce-Arrow bodies built since 1904 have been constructed of cast



Pierce-Arrow Touring Car, the Equipment of Which Includes Electric Lighting, Motor Starter, Power Tire Pump, Etc.

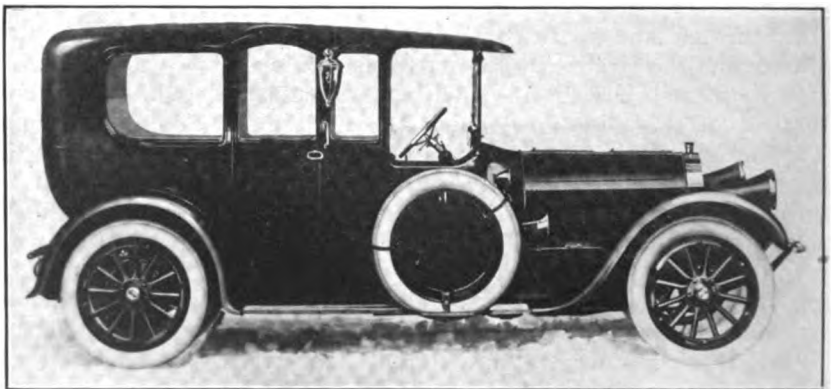
sponsible for the large tire mileage obtained. The axle shafts can be removed readily without dismounting the housing. Tapered roller bearings are utilized, and the wheels are made in the factory, of carefully selected, dried and treated wood.

The brakes are ample in size and are noticeable for their smoothness of action and gripping ability. The steering gear is of the screw and nut type, and all components are ample in size, accessible and adjustable. In keeping with its policy to equip its product with the best accessories procurable, the Pierce-Arrow Motor Car Company will fit all chassis with Goodrich Silvertown cord tires as standard.

Many new features of design are incorporated in the numerous types of bodies offered. The lowering of the frame has resulted in all 48 and 66 bodies being suspended three inches lower, while the 38 designs are 2.5 inches nearer the ground. This lowering of the bodies not only makes them more attractive, but easier of entrance.

The fenders are of new design, being wider, and afford greater protection from mud and water than formerly. A one-man top of Pierce-Arrow design and construction is standard equipment on all touring cars. The regulation cape top of heavier and more rigid construction is offered as an option at no extra cost.

The standard touring cars are fitted with in-



One of the New Types of Enclosed Bodies, Having Rounded Corners and Simple Lines.

aluminum instead of sheet metal. This provides great strength and rigidity and makes possible the elimination of the usual heavy wood backing.

The Pierce-Arrow demountable rims (Johnson patent) are a feature of the equipment. The wheels do not depend upon rims for their strength and no particular care is necessary in adjustment to secure perfect tire alignment. The extra tires and rims are carried on the right hand running board.

The balance of the standard equipment includes the following: Hand inspection lamp, clock, speedometer and odometer on separate dials arranged in a cluster on the dash in connection with the oil and fuel pressure gauges, voltmeter, ignition and lighting switches, starter button, magnetic fuel gauge on tank, power driven tire pump, bulb and electric horns, collision bumper, Pierce-Arrow folding trunk rack, demountable rims, shock absorbers, complete set of tools, supply of oils and greases, extra valves and springs, locked ignition and starter switch, dash cabinet, tool compartments, tire carrier, robe rail, Jiffy curtains, windshield and front compartment ventilator, tonneau lamps in touring cars and dome lights in enclosed machines, adjustable foot rest, telephone to chauffeur, arm loops, utility and smoking sets, Waltham clock, dash clock, umbrella holders, rolling curtains, draperies and frameless windows with regulators in closed cars, hat straps, floor carpets in tonneau, parcel nets and pockets.

The range of color and upholstery specifications open to the selection of the purchaser is practically unlimited. All of the standard combinations are the result of careful study and selection. Particular care has been exercised, as in the past, in the choice of colors with regard to harmony of combination and durability of pigments.

GALVESTON BEACH MEET.

Sanction Has Been Issued for Automobile Speed Contests July 30-Aug. 3.

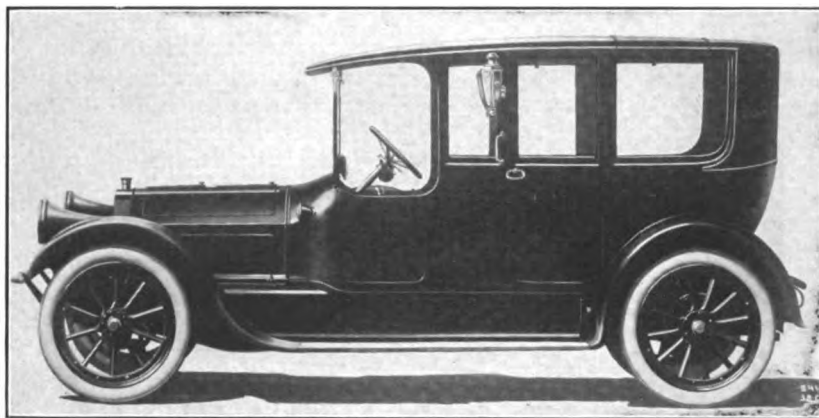
From present indications, Galveston, Tex., is to stage the only automobile beach meet to be held this season. A sanction has been granted by the contest board of the American Automobile Association, and professional events will be run July 30, Aug. 1 and 3, while events for amateurs will be scheduled for July 31.

This will be the sixth annual Galveston beach meet, and the interest has increased very materially from year to year. The entry blanks are not yet ready, but it is understood that the committee in charge has appropriated some \$5000 for cash prizes, and that several cups will be awarded during the meet.

FUEL AND OIL MILEAGE.

Car-Nation Car Completes 838 Miles on 27 Gallons of Gasoline and Two of Oil.

Some interesting fuel and oil figures have been obtained by the American Voiturette Company of Detroit, maker of the Car-Nation car. According to the figures submitted one of these machines travelled 838 miles on 27 gallons of gasoline and two of lubricating oil. N. T. Brotherton of Detroit, with D. D. Thurber as a passen-



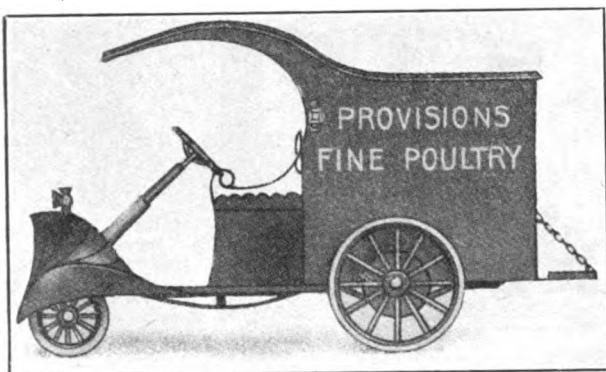
Showing the Unusually Large Frameless Windows of New Pierce-Arrow Enclosed Body.

ger, left Detroit to attend the races at Indianapolis, Ind., a distance of 312 miles. The tank contained eight gallons of fuel and two stops were made to purchase four and five gallons. On the return trip, previous to which considerable mileage was rolled up, 10 gallons were bought, and upon arriving in Detroit the tank was found to contain 1.5 gallons. Mr. Brotherton estimates that considerably more oil was used than would be normally, as the engine was new. The machine carried, in addition to two passengers, three heavy dress suit cases, two sets of golf clubs, spare tires and other material. Although the roads were rough in many places, no mechanical trouble was experienced and the tourists thoroughly enjoyed the trip. Mr. Brotherton figures the cost of the trip at half a cent a mile, including tires. The cost by railroad one way is \$11.80.

AMERICA'S INITIAL ELECTRIC CYCLECAR.

WHAT is believed to be the first electric cyclecar to be developed in this country, at least, is the Heubner, the design of O. E. Heubner, 131 Sumpter street, Brooklyn, N. Y. The primary object of the designer was to produce a machine that would meet the demand for a low priced, small capacity commercial cyclecar, simple in construction, easy to handle and reliable in service. In order to keep the cost down, Mr. Heubner decided upon the use of but three wheels, with the single wheel as the driving member, this construction involving a reduction in friction and tractive effort, in addition to the saving of one wheel, sprocket and tire.

As originally designed, this machine was fitted with a 25-ampere, 18-volt motor, driven by a nine-cell battery, the latter having a weight of



Heubner Cyclecar, the First Electric Design to Be Produced in This Country.

200 pounds. This machine was with the driving wheel at the rear, and the delivery van placed between the two forward wheels. The wheel-base was 96 inches and the tread 54, while the loading space was 36 by 31 by 27 inches.

The machine illustrated was the second one built. It will be noted that the driving wheel is in front. This model is designed to carry a load of 300 pounds, instead of 200, as with the first, and the battery has 12 cells instead of nine. The speed is rated at 10 miles an hour, with a battery mileage of 40 to 50.

The original model has been subjected to numerous tests, and has covered a total distance of 2500 miles. It has average 23 miles to a charge, and the total running cost, including battery renewal, overhauling, painting, oil, charging, driver, storage, interest on investment and 25 per cent. depreciation, is said to have figured out at four cents a mile. The new machine has

not seen sufficient service to give figures of this nature.

It is understood that Mr. Heubner has interested capital in the venture and that pleasure and commercial cars of this type, also with four wheels, but with one driving wheel, are to be manufactured and placed in the market in the near future.

JOY IS SIGNALLY HONORED.

President of Packard Company Becomes Director of National Chamber of Commerce.

The election of Henry B. Joy of Detroit to the board of directors of the Chamber of Commerce of the United States is an honor alike to Mr. Joy and the automobile industry. He is president of the Packard Motor Car Company, Detroit, and holds the same office in the Lincoln Highway Association.

Mr. Joy's connection with the automobile industry dates from 1900, soon after he purchased his first machine from J. W. Packard of Warren, O. It was largely through his activity that the co-operation of Detroit capitalists was secured in the organization of the Packard Motor Car Company and the removal of the plant to that city. In 1903 he became general manager of the concern and later was elevated to the presidency.

FINDS BUSINESS GOOD.

New York Dealer Reports a Prosperous Outlook upon His Return from the West.

That the outlook for business has not been brighter in 10 years is the opinion of Louis Mansbach, treasurer of the Times Square Automobile Company, New York City, upon his return from a business trip throughout the West. He not only visited a large number of automobile factories, but many dealers, large and small, and his statement of conditions as he finds them will prove of exceptional interest. He says:

Good crops are pointed to and this makes the farmer a large potential buyer, especially of the lighter cars. I have found that many of the leading manufacturers, anticipating an active, widespread demand, from this source alone, for five-passenger, four-cylinders cars in the \$1000 class and under, have concentrated their facilities with the idea of being able to meet this demand. Cars of this type are hard to find in the second hand market. This also helps the builder of new cars.

B. A. GRAMM'S POWER DUMPING BODY.

AMONG the concerns engaged in the production of commercial vehicles which have recently added a power dumping mechanism as a standard body installation, is the Gramm-Bernstein Company, Lima, O., maker of B. A. Gramm's trucks. The new design was not placed in the market until repeated tests in continuous service had demonstrated its practicability in every way.

The chassis is a standard construction, except for the addition of such necessary equipment as is required to operate the power hoist, which is actuated by the driver from the seat. The design is such, however, that the weight of the body is unusually well distributed, and a considerable percentage is carried forward of the rear axle. The body is so installed that it can be elevated to an angle of 40 degrees.

Back of the driver's cab is mounted a cylinder filled with oil, and the piston rod carries at its upper end a cross arm with a larger sheave at either end. Wire cables anchored to the chassis frame are carried over these sheaves, and are attached to arms projecting downward from the forward end of the body.

The oil is circulated from the upper side of the piston and forced into the lower end of the cylinder by a gear pump that is driven by the propeller shaft ahead of the transmission gearset. As the piston is forced upward in the cylinder, the body is carried upward to the extreme elevation, where it stops automatically, and the oil will bypass when a certain pressure has been reached. By reason of the oil pressure after the body has been elevated the piston will fall to the bottom of the cylinder, the oil having a cushioning effect.

APPROVES SHALER VULCANIZERS.

Goodyear Tire & Rubber Company Orders Them for All Its American Branches.

Shaler vulcanizers, made by the C. A. Shaler Company, Waupun, Wis., which have been in

use for a number of years by car owners, garages and automobile manufacturers, have received still another seal of approval, which is very gratifying to the maker. One of the largest tire producers in the country, the Goodyear Tire & Rubber Company, Akron, O., has ordered a stock of these vulcanizers for every Goodyear branch in the United States.

It is understood that the Goodyear company has decided that car owners can obtain the best possible service from tires only by taking care that the small cuts are sealed before sand, dirt and water are permitted to disintegrate the fabric. It is stated that instructions have been is-



Five-Ton B. A. Gramm's Truck, Fitted with New Hydraulic Hoist and Dumping Body.

sued to each branch to see that as many Goodyear users as possible employ a Shaler vulcanizer to prevent premature tire deterioration.

BECOMES DETROIT MANAGER.

J. M. Flannery Will Direct Distribution of K. D. Carburetors in State of Michigan.

J. M. Flannery has been appointed manager of the K. D. Carburetor Company of Cleveland, having charge of the company's interests in the State of Michigan, with offices at Detroit.

Mr. Flannery, for the past six years, was associated with F. J. Alvin with the Kingston Carburetor Company, the latter now being sales manager of the Sears-Cross Company.

GOODRICH COMPANY'S TOURING BUREAU.

FROM Cape Cod to the Golden Gate, and from Michigan to Florida, the B. F. Goodrich Company's touring bureau has covered the country with sign posts to guide the motorist on his way. Not only that, but the Goodrich people have mapped almost every good road in the country and put their vast collection of data, relating to routes and touring information, into books, which are being distributed free of charge.

Year by year, this service, which is held to be the only one of its kind in the world, has been extended, until the 1914 edition of these books presents data covering 300,000 miles of the best touring routes in this country, Canada and Eu-



Touring Data Supplied Free by B. F. Goodrich Company.

rope, plotted so that motorists can go anywhere they want to and have a safe and sure guide all the way. Each book covers a particular territory and there are also "road logs" of different tours and routes connecting large centres; "Rules of the Road", crammed full of information about driving, care of the car and the tires, and other information, and the "Memory Book of Motor Yesteryears", in which the tourist can record his trip records, odometer readings, speedometer readings and character of the hotels and garages visited en route.

During the coming touring season the Goodrich touring bureau will send out 2000 pieces of touring information daily. This service is offered cordially to every motorist, whatever the make of car or tires used by him. There is no charge whatever for advice, information or route books.

The American tourist abroad has not been overlooked, and the European route book, now ready, gives customs regulations of the princi-

pal countries, how to ship the car, and how to get about on the Continent. In addition to a fully equipped factory in France, the B. F. Goodrich Company has branches in London, Paris, Brussels, Frankfurt and Marseilles, with agents and stockists in all the principal European cities. At all of these inch-sized tires, either Safety tread or otherwise, are carried in stock for the special benefit of the American tourist abroad.

All the books mentioned herein may be had free upon request made to the nearest branch of the B. F. Goodrich Company, or by addressing the factory at Akron, O.

A. A. A. GOOD ROADS PATRIOTS.

Will Rally July 4 in the White Mountains—
Many Notables to Be Present.

Governor Felker of New Hampshire will head the list of noted speakers who will address the good roads session of the midsummer meeting of the American Automobile Association, to be held at Hotel Maplewood, Bethlehem, N. H., on the afternoon of July 6. White mountain visitors generally are invited to attend the highways gathering, which will be in charge of Chairman George C. Diehl of the A. A. A. National Good Roads Board.

State Highway Commissioners S. Percy Hooker of New Hampshire, Lyman H. Nelson of Maine and Charles W. Gates of Vermont will tell of roads development in their respective states. An address which will have some reference to federal aid will be delivered by Paul D. Sargent, the state highway engineer of Maine, who was formerly acting director of the United States office of public roads of the Department of Agriculture. Col. W. D. Sohler, chairman of the Massachusetts Highway Commission, also expects to be present.

The A. A. A. is accentuating New England territory this summer, for the reason that a year hence there will be a decided trend to the Pacific Coast, on account of the Panama-Pacific Exposition in San Francisco, and the magnet of wonderful road accomplishments in southern California, as well as in Oregon and Washington. Early inquiries to the A. A. A. touring bureau indicate a substantial army of road travelers who will head westward in 1915.

PLANS FOR THE NEXT 500-MILE RACE.

FIVE hundred miles at 100 miles an hour, without a stop or tire change, on one gallon of oil and 25 gallons of gasoline, is the difficult target set by the management of the Indianapolis motor speedway for the motor industry of the world to reach during the next three years. It is expected that the fifth international sweepstakes race, to be held Memorial Day, 1915, will show a distinct step in that direction.

While all the details of the next competition have not been arranged as yet, it is announced that the cubic inch piston displacement will be cut from 450 to 300. The minimum weight will remain the same, 1600 pounds. These specifications are expected to stay in force for at least three seasons, or until every branch of the science in this class of competition has been thoroughly probed. When there is no more to be learned, it is explained that a further reduction will be effected, less than 161 cubic inches being the final goal.

The speedway management holds that regulations of this character naturally put automobile racing into the experimental division of the industry, where it properly belongs. It is added that the day when makers can take stock and semi-stock models and compete with them successfully is past, as was proven by the results in the last 500-mile race.

Europe has for some time regarded such contests in the light of a laboratory, not as a proving ground, and it is expected that a number of American manufacturers will enter this field from business, if not patriotic, motives. In order to carry out this plan it will be necessary to institute special racing departments, having no connection whatever with the ordinary branches of production, except to lead the way.

The statement continues that this movement will see the finish of the "barn built" car, which has been so prominent in American racing of late. With the finest engineering skill and the best of materials required to win success, it is not thought likely that the heterogeneously assembled freak will have a chance. The only thing that will be left to do is to quit.

In advancing the art, the speedway management proposes to do its material as well as its normal share. To render high speed work more safe, the surface of the track will be widened 15 feet on the inside and retaining walls will be built all around it. Additional comfort will be provided for drivers and mechanics by a club-

house outside the grounds, this to be fitted with a swimming pool and other conveniences. The statement concludes that if the gasoline efficiency of the present era is not raised wonderfully during the next few seasons, it will not be the speedway's fault.

MERCER DEFEATS STUTZ.

Texas Owners Seek to Determine Relative Merits of Two Makes of Cars.

Following the recent 500-mile race at Indianapolis, Ind., the feeling between Mercer and Stutz owners in Houston, Tex., ran high. Varied claims were made for the cars of each make, and the rivalry finally culminated in a match race between a stock Mercer touring car carrying driver and two passengers and a stock Stutz "Bear Cat" raceabout with driver only.

Two one-mile trials were held, in which the Mercer covered the distance the first time in 57 seconds and the second time in exactly one minute. The Stutz made the mile the first time in 1:06 and the second in 1:07. At least, that is the information that comes over the wires from Houston, but the matter does not appear to have been settled, since the Stutz owner is said to have challenged the Mercer owner for another race on the Galveston beach, during the beach meet to be held the latter part of July.

MUCH INFORMATION.

Red Book of New England Has Many Points That Motorists Will Find Invaluable.

The Red Road Book of New England is meeting with considerable favor among automobilists. In addition to all the regular maps, it includes nine plates, which show not only automobile routes in the White mountains, the play ground of New England, but also gives much detailed information that every motorist desires to know.

The city maps are especially noteworthy. By the intentional elimination of many streets unnecessary to the automobilist, each map stands out with its information like a cameo, the main thoroughfares only being shown. Along these are such landscape marks of importance to the autoists as are visible from a distance.

MOTOR & ACCESSORY MANUFACTURERS.

MOTORISTS and others connected with the industry will be interested in the brief explanation of the work and purposes of the Motor & Accessory Manufacturers presented below. From time to time, mention is made of this organization in motoring prints, but, aside from the fact that it is the representative body of the accessory concerns, very little is known about it by the average layman. The following statement has been prepared by James H. Foster, president of the association:

By James H. Foster.

Since the inception of the Motor & Accessory Manufacturers, 10 years ago, the board of directors



James H. Foster, President, Motor & Accessory Manufacturers.

had aimed to run the organization on a business basis and along conservative and productive lines, without noise or hoorah. Because of this fact, many people probably do not know that the membership of the association now numbers 262 firms and corporations of the highest standing, and perhaps few people realize that the combined capital of the said interests represented in the membership is somewhat over \$440,000,000. From a small beginning the association has grown into one of the strongest trade associations in the world. During the steady growth, many of the original plans

of the organizers have been followed out successfully and the trend of the times and varied changes in the industry have brought about conditions opening up a number of new fields of endeavor for the association. Just how the Motor & Accessory Manufacturers benefits its members is obvious to a certain extent, and beyond that, there are many benefits which members are in a position to receive, but which are not quite so obvious to the person who is unfamiliar with the organization and its work. Its primary objects are to promote in all lawful ways the interests of makers of automobile motors, motor parts, or accessories; to aid in the protection of its members; to secure the advantages to be obtained by mutual co-operation; to facilitate the collection of the claims of its members and the diffusion of information concerning the trade, dealers, credits and other matters of interest to the members of the association.

The membership is limited to individuals, firms or corporations exclusively manufacturers and as such engaged in the manufacture of motors, motor parts, appliances or accessories used on or in connection with motor vehicles, or who may make so large a portion of the product disposed of by them as to be in the discre-

tion of the board of directors considered eligible for membership.

How New Members Are Benefited.

For example: Take a typical concrete case of a condition which is arising frequently. An inventor or an engineer has a certain patented device which he is anxious to see manufactured and marketed. The device or design has certain obvious merits. He interests capital in his proposition and the capitalists are willing to concede that the article is one of merit and stands good chances of being marketed profitably. In getting down to cases, however, when considering forming a company, the capitalist often says to the owner of the patent:

"You have a good thing and we are interested in backing your proposition, but I and my associates are not automobile men. We do not know the ins and outs of the motor accessory industry. You are an engineer and an inventor and not a business executive. You say that you will secure the services of a competent sales manager and business staff, but the matter of gathering together a good organization is a gamble. How do we know that your prospective organization is going to be competent to cope with new conditions arising, meet competition and emergencies, patent litigations, etc."

And the reply is:

"As soon as we organize and commence manufacturing we shall apply for membership in the Motor & Accessory Manufacturers, which is an organization that will materially aid us in introducing our product in a profitable and practical manner".

For instance, there is the credit department, which furnishes ratings on all automobile manufacturers, corporations and individuals connected with the automobile industry, and collects and disseminates other useful financial information to members. Then there is a traffic department, with information and advice on all matters pertaining to the receiving and shipping of goods and proper routes. Also there is a legislative department, which collects, for reference purposes, copies of all state and federal legislation when introduced, affecting either directly, or indirectly, members' interests, and is otherwise active in automobile legislation.

This makes a very fair and convincing argument for the capitalist and after more details of the association are explained to him, if he is not already familiar with the work of the organization, its benefits are at once apparent.

However, the Motor & Accessory Manufacturers is not of benefit only to new members, nor is the period of its usefulness confined to those months when a new member is getting his business started. The departments operated and results otherwise accomplished are strikingly beneficial to long time members as well. In fact, of 39 charter members, there are still 29 identified with the association.

The Motor & Accessory Manufacturers solicits additional members, not because it requires them to swell the treasury, but because "In Union There Is Strength". It offers to such new member the firm knowledge that it receives 262 times as much as its one contribution in collective benefits. Besides, it is a commercial duty for a firm, whether just establishing itself, or already established, to be within the field of benefits which this inter-communicative membership privilege grants.

Members agree that the credit department alone is a feature that makes membership well worth while. The more progressive concerns, selling either largely or in a limited way, feel that they cannot afford to be outside the privilege of these reports.

Concerning Show Matters.

The Motor & Accessory Manufacturers has been able to save the industry hundreds of thousands of dollars in needless or unwise expenditure. One thing that has been aimed at has been the matter of endeavoring to govern attempts to increase the expense of members exhibiting at shows. The fact that practically every city of any size has its annual automobile show—and quite frequently shows occur simultaneously—makes it impossible for a manufacturer of parts and accessories to exhibit at all of these during a show season. Incidentally, the expense involved is too great.

This resulted in what is known as the sanction rule. It was generally agreed that two national shows a season involves sufficient expense for the average manufacturer to afford, and accordingly, the two national shows in New York and Chicago, respectively, were chosen to be sanctioned by the Motor & Accessory Manufacturers. Their members were privileged to exhibit at these and not elsewhere. Hence, instead of chaotic competition reigning, the matter of exhibiting the goods of members to the public and to the trade each winter has been systematized so that every member is placed on an even footing with his fellow members.

The association does not exploit show benefits especially. They are present, but the aim of the organization is to bear most heavily on the fraternal and co-operative benefits secured by membership, rather than on such side issues as are involved in exhibitions. It is most important for members to be under protective care in show matters.

TO HANDLE BRAENDER TIRES.

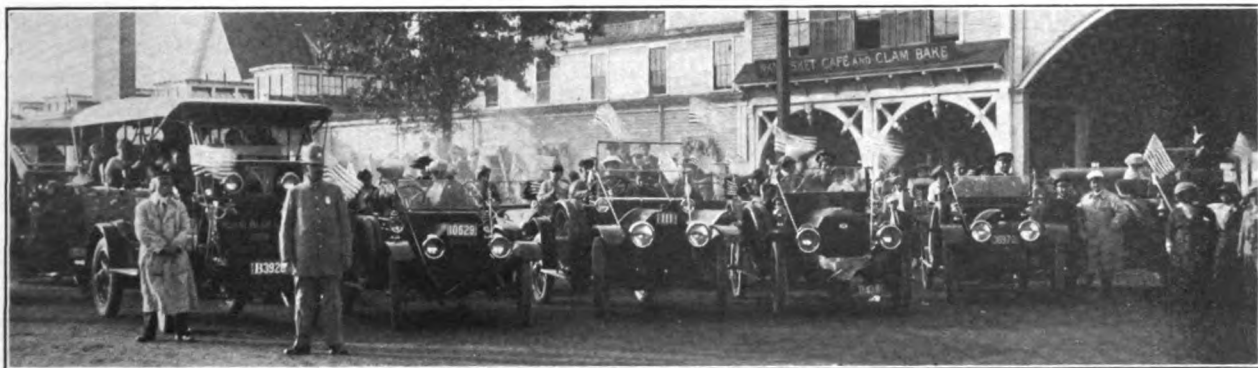
Gross Hardware Company, Milwaukee, Appointed Sole Agent for Wisconsin.

Announcement is made by the Braender Tire & Rubber Company to the effect that it has ap-

outing and over 400 machines were necessary to transport the youngsters to and from the beach. These cars were contributed by members of the association and private owners of Boston, who responded liberally to Mr. Campbell's invitation to loan the use of the cars with drivers for the day. The expense of the outing was met by members of the association, who contributed several hundred dollars, and the subscriptions of the general public.

The run to and from Nantasket beach, which is over one of the most delightful roads in Massachusetts, was made without a single mishap, and the little ones, many of whom had never ridden in an automobile, enjoyed the ride immensely.

At the beach Secretary Campbell dined his guests at the Nantasket hotel, and during the day there was plenty of pop corn, candy, ice cream and those delicacies that appeal to chil-



Showing a Part of the Fleet of Automobiles Which Transported the Children in the Seventh Annual Outing Conducted by the Boston Automobile Dealers' Association.

pointed the Gross Hardware Company, 126 Grand avenue, Milwaukee, sole agent for the Braender Bull Dog non-skid tire for the State of Wisconsin. The connection, which seems a most promising one to the parties concerned, was effected through the efforts of A. J. Duth of the Alfredal Company, who has represented the Braender tires at Chicago.

SEVENTH ANNUAL OUTING.

Boston Automobile Dealers' Association Entertains Children at Nantasket Beach.

Secretary Chester I. Campbell of the Boston Automobile Dealers' Association, played host to about 2000 crippled, orphan and destitute children Wednesday, June 10, when the annual outing of these little ones was held at Nantasket beach.

It was an ideal day for the seventh annual

dren. The merry-go-round and other beach attractions were free to the youngsters, many of whom are shut up most of the year in charitable homes in and around Boston.

There was entertainment for the drivers of the cars and some very nice prizes were donated by Boston merchants. Arthur Duffy, the well known sprinter, was starter for the games, and James T. Sullivan, automobile editor of the Boston Globe, was referee of the contests.

That the outing was a decided success was largely due to the personal supervision of Mr. Campbell, who gave his usual careful attention to details and whose efforts are appreciated by the children, as well as those who contributed to make the event an enjoyable one.

Preparing the Car for the touring season will be comprehensively dealt with in the Eighth Annual Touring Number of The Automobile Journal, particularly overhaul of chassis components.

METZ RETAINS THE GLIDDEN TROPHY.

THERE will be no Glidden tour this year. At least, that is the present indication. Because of lack of entries, the Chicago Automobile Club, which had the non-stop Chicago-Boston event in charge, has abandoned the undertaking. As a result the Glidden trophy will remain in the possession of the Metz Company, Waltham, Mass.

Once before, in 1912, there was no Glidden tour, and for the same reason. Early in that year, the contest board of the American Automobile Association sought to substitute the A. A. trophy for the famous classic, and, although two routes, one from Washington through New England to Ottawa, and the other from Detroit to New Orleans, were mapped out, insufficient entries made it advisable to abandon the attempt.

Last year, 21 cars covered the 1233 miles between Minneapolis to the Glacier national park in Montana, the Glidden trophy being awarded as a team prize. The three Metz 22.5 horsepower roadsters composed the only team to make the trip with a perfect score.

This year the regulations adopted for the annual national reliability tour, as the event is known officially, prohibited the Metz from defending its title to the famous cup, since it was to be made the award in the class for cars selling at more than \$1200. With less than a month remaining before the start of the event, but two cars had been entered, a Hupmobile and a Jeffery, and neither of these were eligible for the Glidden trophy.

The history of the Glidden tour is told by the following tabulation:

Year	Route	Miles	Victor
1905	New York-Bretton Woods-New York	871	Pierce
1906	New York-Buffalo-Bretton Woods	1135	Pierce
1907	Cleveland-Chicago-New York	1570	•
1908	Buffalo-New England-New York	1670	†
1909	Detroit-Kansas City	2533	Pierce
1910	Cincinnati-Southwest-Chicago	2851	Chalmers
1911	New York-Jacksonville	1454	Maxwell
1913	Minneapolis-Glacier Park	1233	Metz

*Won by team representing Automobile Club of Buffalo, composed of two Pierce cars, a Thomas and a Packard; no award was made.

For some months there has been a movement on foot looking toward a transcontinental tour from New York City to San Francisco in 1915, under sanction from the contest board of the American Automobile Association. It is entirely probable that this event will be held, the Panama-Pacific exposition at San Francisco being the objective point of the tourists, and it seems feasible

to make this the next competition for the Glidden trophy. Every effort will be made, however, to have the regulations so framed that the Metz Company may have full opportunity to defend the honor so richly earned during the tour of 1913.

MR. AND MRS. WISHART.

Bridegroom May Be at the Wheel of a Mercer in Sioux City 300-Mile Race.

Spencer E. Wishart and Miss Louise McGowan, second daughter of the late Hugh J. McGowan, traction magnate of Indianapolis, were married at the bride's home in Indianapolis, June 23. Mr. and Mrs. Wishart will spend a portion of their honeymoon abroad, but it is not expected that they will sail until some time in July, since Mr. Wishart is scheduled to drive a Mercer car in the 300-mile race on the Sioux City speedway, July 4. And he will return in time to drive a Mercer in the Elgin road races the latter part of August.

Wishart is said to be independently wealthy. He has been driving high speed cars in all sorts of contests for the past eight or nine years, purely through love of the sport. It was in the 1909 Vanderbilt Cup race that he came prominently into public notice. In that event he made round after round of the Long Island course, setting the pace for a field of veterans, although mechanical trouble eliminated him before the close.

For a number of years Wishart drove foreign cars only, these machines being owned and entered by him. Since September, 1912, he has been seen at the wheel of the Mercer. In his first race with that machine on the dirt track at Columbus, O., he secured world's records for all distances between 75 and 200 miles. Last year he drove a 300-cubic inch Mercer into second place, directly behind Jules Goux in the Peugeot, in the 500-mile race at Indianapolis.

An exhibition of electric pleasure vehicles was held last month in the new showrooms of the New York Edison Company, Irving place and 15th street, New York City, under the auspices of the Electric Vehicle Association of America. Among the cars on view were the following: Ohio brougham, Rauch & Lang town car, Detroit runabout, Baker brougham, Waverley roadster and a Ward coupe chassis.

DETAILS OF XENIA, A TRUE CYCLECAR.

WITH a factory having capacity for 30 cyclecars a day, the Hawkins Cyclecar Company has begun the production of the Xenia machines at Xenia, O. During the month of May it is stated that an average of five machines a day was manufactured, and plans were perfected for doubling this output during June.

The experimental car, which was known as the Hawkins, was in actual use for nearly a year before the factory was opened, and is said to have demonstrated its efficiency in every particular. It is explained that the first stock car was started on a 1000-mile trip the same day it was completed, and immediately after its return to the factory, without adjustment, it was sent out on a time trial for two miles, with two passengers, and covered the distance over fine macadam in two minutes flat.

The company is incorporated for \$50,000, and there is no stock for sale. The officers are: President, George Little; vice president, John W. Prugh; secretary, A. V. Perrill; treasurer, C. H. Little; engineer, P. E. Hawkins; directors, the above and Marcus Shoup, J. F. Orr, H. S. LeSourd and T. H. Zell. The factory is a fireproof structure, affording 20,000 square feet of floor space, and it is stated that it has been fully equipped with modern machinery.

The Xenia is a true cyclecar, having a two-cylinder, air-cooled De Luxe motor, with bore of 3.5 inches and stroke of 3.67, giving a piston displacement of 70.6 cubic inches. The wheelbase is 100 inches; tread, 36, and road clearance, nine. The weight is 600 pounds. The two passengers are seated tandem.

Ignition is by the Atwater Kent Unisparker system, and the carburetor is a Schebler. Transmission is of the planetary type, with disc clutch, affording two speeds forward and reverse. This is directly connected to the drive shaft by heat treated bevel gears running in oil. Final drive is by belts from jackshaft pulleys to the rear wheels. The belt has a cable insert and is claimed to be practically stretchless.

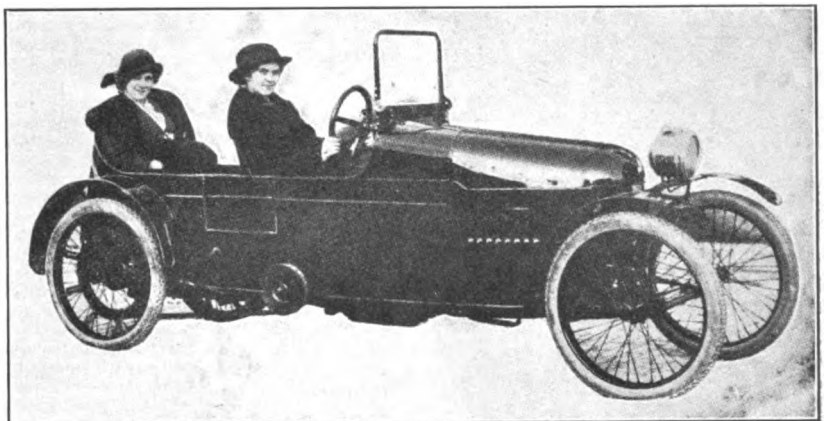
The frame is of pressed steel and the spring suspension is held to be of an exclusive design,

this being underslung in front, and suspended on a cross member at the rear, cantilever. Brakes act on the rear wheel hubs. Wheels are of wire, taking 28 by 2.75-inch tires.

VEHICLE TAXATION.

Universal Fee for Road Maintenance Urged to Solve Difficulty of Highway Upkeep.

Howard E. Coffin, vice president of the Hudson Motor Car Company, Detroit, said recently that all vehicles, whether horse or motor driven, will be taxed for road maintenance. Appropriations for road building have been made generally, but little attention has been paid to financ-



The Xenia is a True Cyclecar, Seating Its Two Passengers Tandem.

ing a proper road maintenance year after year. He recognized the neglect of the highways as a serious offset to the large outlays for new roads that are constantly being made throughout the country.

Mr. Coffin is said to have been instrumental in the preparation of a paper on "An Engineering Basis for Taxation of Automobiles", that is to be read at the meeting of the Society of Automobile Engineers, to be held at Cape May, N. J., June 23-27. He, however, disclaimed all responsibility as to the paper, stating that it is entirely the work of C. O. Egerton and S. I. Fekete, who are members of the Hudson Motor Car Company's engineering staff. At the same time he indicated plainly his familiarity with the subject and his own personal conviction as to the correctness of the principle of taxing all users of the highway on the basis of the benefit derived.

TOURING WITH ELECTRIC AUTOMOBILES.

WITH the object of pointing out the adaptability of electric automobiles for suburban use, the New York Electric Vehicle Association, Irving place and 15th street, New York City, has prepared, and is distributing through manufacturers and agents of electric cars, what is believed to be the first touring route book ever provided especially for the users of such vehicles. The book has 54 pages and is entitled "Electric Touring".

It indicates resorts and routes within the touring capacity of the electric, showing the map distances, alternate routes and charging stations.



J. S. Codman, Treasurer, Electric Motor Car Club of Boston.

The longest runs are to Poughkeepsie on the north, New Haven on the east and Trenton and Atlantic City on the south, the starting point in each instance being the Metropolis. A particular feature of interest to electric vehicle men is the designation of charging sta-

tions and the route mileage between each.

In this connection, it is of interest to note that the Electric Vehicle Association of America, with headquarters at 29 West 39th street, New York City, is giving this subject important study, as is evidenced by the following discussion, prepared for that organization, by J. S. Codman, treasurer of the Electric Motor Car Club of Boston:

By J. S. Codman.

Has the day of the electric touring car arrived? Or, if not, how far distant is it, and what must yet be done to hasten its coming? We cannot say that the day has come, but on the other hand it is close at hand and the obstacles still in its way are neither many nor great.

Already the electric has ceased to be merely a town car. In addition, it is now the ideal runabout for both city and country work. It is more convenient, more dependable, more comfortable and cheaper to operate than a gas car, and within the last few years has been so developed that actual road runs of 70 to 100 miles have

been made at a speed considerably greater than the usual road speed of the gas car.

Tours Already Made.

As regards touring, the electric has sufficient speed, and two notable tours made within the year show also that rough, muddy and hilly roads and bad weather are not real obstacles.

Last summer, a tour of between 500 and 600 miles was made in an electric through the Green mountains of Vermont and the White mountains of New Hampshire, and no difficulty was experienced. The distance from Boston to Burlington, Vt., 258 miles, was made at an average running speed of 19 miles an hour. The route taken was through Fitchburg, Ashby, Jaffrey, Dublin, Marlboro, Keene, Walpole, Bellows Falls, Springfield, Rutland, Brandon, Middlebury, New Haven and Vergennes, and motorists who have been over this route will recognize that some parts of it present many difficulties. The slowest run was from Keene, N. H., to Springfield, Vt., 42 miles, at 16.7 miles an hour, and was made almost entirely after dark. The fastest section covered was from Boston to Fitchburg, at 21.3 miles an hour. The 78 miles from Rutland to Burlington, including detours, was made at exactly 20 miles an hour.

An even more notable run was made last October, from Boston to Chicago, during the worst weather of the season, which turned many roads into sloughs of almost impassable mud, but again no greater difficulty was experienced than might be expected with any car under such circumstances.

Difficulty of Charging.

If the electric automobile is not lacking in speed and is fully capable of meeting all road conditions, what then is the obstacle to its use for touring? As is evident everywhere, it is the difficulty in getting charged on the road. This difficulty, however, is not to any great extent a difficulty inherent in the car itself.

It is true that a battery cannot be filled as quickly as a gasoline tank, but on the other hand, the delay is not great if proper facilities can be obtained. Boosting a battery at high current rates is perfectly practical today. The Edison battery is notable in this respect, and even lead batteries, it is now understood, can be charged without injury at much higher rates than was formerly thought possible, if only proper care is taken to reduce the rate before the gassing point is reached.

I have, on one occasion out on the road, boosted a battery at 200 amperes for one hour. This battery was composed of Edison A-6 cells, rated at 45 amperes normal current, and it absorbed in that hour enough charge to have carried me about 50 miles. On this occasion my cable was passed through the window of the electric light station and connected directly to the exciter bus, and very little time was lost in getting connected.

In touring, however, an opportunity such as the above is seldom offered. Usually, much time is lost in getting connected, and the ampere rate obtainable is usually low. It is this inability to get satisfactory charging service which is the one great obstacle to touring in an electric. Public charging stations are few and far between, and when found are, as a rule, equipped with a hopelessly inadequate 30 or 40-ampere rectifier. On the other hand, if you go to the electric plant itself, where there is ample power, you will nearly always find those in charge totally unprepared, and you cannot be accommodated unless someone in authority happens to be on hand, and only then after much time consumed in getting ready. It is not practical to spend an hour getting ready to begin a half-hour's boost.

The Central Station.

The overcoming of this great obstacle to touring with an electric is something we must leave largely in the hands of our central friends. Generally speaking, they are most willing to help when an emergency arises, but this does very little real good. What is needed is apparatus all ready for use, and someone about the premises who knows what ought to be done.

Of course, there are central stations which provide ample and convenient charging facilities, but they are very exceptional. In most of the small towns, and even

In many large cities, proper facilities for charging are either non-existent or are very inadequate.

Taking New England for example: Massachusetts is, as compared with the other states, well equipped with charging facilities, and yet what are the figures? McGraw's Central Station Directory reports 114 electric light companies operating in over 300 of the 333 towns and cities in Massachusetts. On the other hand the list of charging stations compiled by the Electric Motor Car Club, after a canvass of all the garages and electric light companies, indicates only 53 towns in which the charging stations are supposed to be located, and only 28 towns where more than 50 amperes can be obtained.

Equipment Necessary.

It would certainly seem that where there is in a town no public charging station capable of giving an adequate boost, at least 100 amperes at 125 volts, the electric light company itself should have ready for use a service connected with the exciter bus. This service should consist of a switch, fuses and terminals for connecting to the cable and charging plug, which every motorist should carry himself. It would be best to have ready a cheap resistance coil for controlling the current, but often even this is unnecessary, especially when the Edison battery is used. Measuring instruments are not necessary, especially when the Edison battery is used. Measuring instruments are not necessary, as it is the service rather than the amount of current which should be charged for, and further, an approximate measurement can usually be made by means of the instru-

ments on the car itself. Such an outfit would be very inexpensive.

In the face of records of this kind, it is time for the central station man to do his part, and if he cannot arrange a neat little installation of battery charging equipment by using his exciter for this service at a cost which is too small to consider, he must indeed be lacking in enterprise. It ought not to be necessary for an electric automobilist to telephone ahead from a point several hours' run away in order to secure the required charge on arrival.

We are inclined to think that most central station men will go out of their way to accommodate the cross country driver of an electric automobile in the particular rare instance when such a machine comes along, but what is really needed is a readiness-to-serve policy which will make the purchase of a charge as simple a matter as the buying of five or 10 gallons of gasoline from the village grocery—a continuous availability of the charging apparatus at all hours and at a fair price.

With the increase of day service even among the smallest central stations, the time has passed for indifference or sluggishness in the matter of being ready to charge vehicle batteries at 2 in the morning as well as at 6 in the evening, through simple home made flexible connections and resistances, whose cost is nominal. Of course, the electric automobiles will not come until the small central station is prepared to charge them; the latter must get into line and be ready for the business, and the ultimate profits are already clear to the far-sighted student of electric vehicle development.

DETROIT ELECTRIC MAKES LONG RUN.

PRACTICALLY coincident with the convention of the National Electric Light Association in Philadelphia, at which Thomas A. Edison and Dr. C. P. Steinmetz prophesied that inside of 10 years the central stations of the country would be reaping \$60,000,000 a year additional net profit from the sale of current to electric vehicles in the "off-peak" hours, R. L. Heberling of the Philadelphia Storage Battery, and J. D. Maxwell, Jr., of the Detroit Electric Car Company, made a demonstration of the capabilities of a modern high powered electric car for general cross country work.

Leaving Philadelphia, Sunday morning, in a stock Detroit electric roadster, with standard battery equipment, such as is regularly furnished in cars of this type, they went to Washington, D. C., stopping for "boosts" at Wilmington, Del., and Bel Air, Baltimore, Md. After a pleasant evening and a good night's rest, several hours were spent in driving about the National Capital, before returning to the Convention city Monday.

The details of the trip are told in the accompanying table.

While this run established a new record for an electric car between these points, it also demonstrated the wonderful development which has taken place in battery construction. Philadelphia is held to be the home of the storage battery industry, and can point with pride to the great reductions in weights and increases in capacity accomplished by the Philadelphia Storage Battery Company.

REMY LINE IN EUROPE.

The Remy Electric Company, Anderson, Ind., maker of ignition, lighting and motor starting systems, has appointed Walter H. Johnson, 60 Haymarket, London, England, as manufacturer's agent in Europe. Mr. Johnson will also open a completely equipped service station to take care of all users of and dealers in the well known Remy products in that section of the world.

ITINERARY OF RECENT TRIP OF DETROIT ELECTRIC, PHILADELPHIA TO WASHINGTON AND RETURN.

Left	Time	Arrived	Time	Miles	A. H.	Running Time	M. P. H.	A. H. Boost
Philadelphia	4:13	Wilmington	5:48	32	75	1:35:00	20.6	75
Wilmington	7:54	Bel Air	11:42	64	167	3:48:00	17.0	58
Bel Air	2:28	Baltimore	4:10	25	71	1:42:00	15.0	120
Baltimore	6:42	Washington	9:12	46	105	2:30:00	18.0	...
Washington	11:00	Baltimore	12:58	42	105	1:58:00	21.0	102
Baltimore	3:52	Bel Air	6:15	32	86	2:23:00	15.0	71
Bel Air	9:15	Wilmington	1:20	74	190	4:05:00	20.0	100
Wilmington	4:10	Philadelphia	5:37	32	79	1:27:00	22.0	...

"SAFETY FIRST" WHEN TURNING CORNERS.

A PARAGRAPH in the instruction book of a well known car manufacturer deals specifically with the thoughtlessness of some drivers

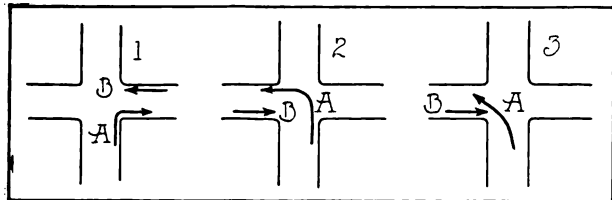


Diagram Showing Correct and Improper Method of Turning Corners.

when turning into another road, and the suggestions are emphasized by diagrams which are reproduced herein. They will be of decided value to the new driver and some of the more experienced operators who do not practise the consideration for others that they should.

The practise of driving across an intersecting road, heedless of what may be coming on the road that crosses it at right angles, and especially when the view is obstructed, is responsible for many narrow escapes from collisions and accidents.

In turning a car into another road at the right the driver should keep his car as near to the right hand side as possible, as shown at Fig. 1. Here the machine A is turning to the right while the car B is proceeding in an opposite direction. Under these conditions there is room for both to pass.

Fig. 2 depicts the automobile B proceeding in a right hand direction, and the machine A in turning into the road has swung around the centre of its intersection. Under these conditions the operator of the car B will have ample time to check the motion of his vehicle, as he has practically the width of the street in which to bring it to a stop if necessary.

The diagram at Fig. 3 shows the wrong way of making a corner. Here the driver of the machine A has cut sharply to left and it is obvious that the operator of the automobile B has but little opportunity to avoid a collision, the blame of which, of course, rests upon the driver of the other car.

If every driver will bear in mind that the other operator is entitled to a safety share of the highways and extends that courtesy he would receive, there is no doubt that much would be done to overcome the thoughtlessness above re-

ferred to. Highway courtesy or etiquette of the road is to be commended under all circumstances.

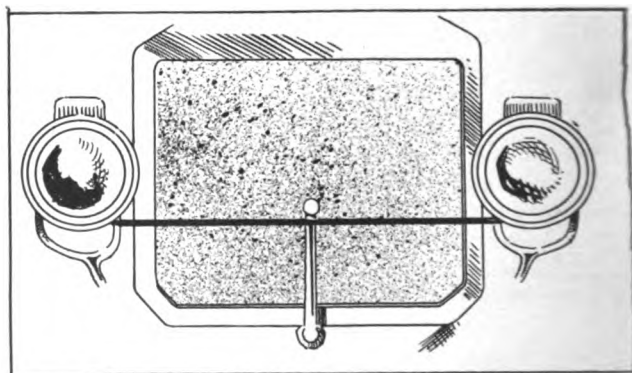
NOVEL CRANK HOLDER.

The starting crank handle should not be allowed to swing idly, as its bearing is subjected to unnecessary wear which in time will cause an annoying rattle. While leather holders with straps can be purchased for a small sum, considerable ingenuity in the design of a crank handle holder was noted by the writer.

The machine was a model T Ford, and attached to the headlight brackets was a strip of round rubber or cable as shown in the accompanying illustration. It was so secured that when the handle was placed in a vertical position there was sufficient tension of the rubber to hold the handle as indicated in the drawing.

Not only is the fitting inexpensive and easily made, but the owner of the car states that it prevents the handle from rattling and that he can obtain quicker service in starting than with the usual strap method. The rubber was covered with a braid to protect it from the weather and the installation does not detract from the appearance of the machine.

A motorist who has had considerable experience in setting carburetors recommends adjusting them at night, when the color of the exhaust is noted more easily. This method is well known to carburetor experts, who advise an adjustment that will result in a purple flame. A yellow flame



Novel Crank Handle Holder Constructed of Rubber Band or Cable.

denotes too much air, and a blue too much fuel. The work is performed with the cut-out open or with the exhaust manifold displaced.

ELIMINATING DEFECTS OF DIFFERENTIAL.

THE differential is generally described as a form of equalizing gear which permits the machine to round corners. Its function is to permit one wheel

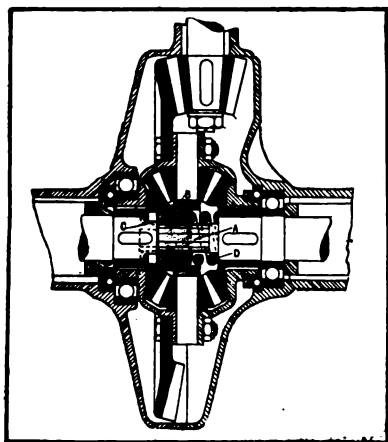


Fig. 1—Romeiser Differential Gear.

to travel slower than another when turning, but at other times the wheels should revolve at the same speed, even when one wheel has traction and the other is either on a greasy surface or clear of the road. Because of the

differential gear, directly the grip between the rear wheels varies the rate of revolution of the wheels changes and one will slip. If the spinning wheel be on a slippery road, there is a tendency for the car to slide or skid. If one of the rear wheels be resting on a slippery surface and the other obtains a grip on the road surface, the first named will spin, or, in other words, take the drive, because of the least resistance. In such a case the machine would be moved slowly if at all.

The Luxmore Differential Company, 21 East Van Buren street, Chicago, is to market a differential gear which is held to overcome the above named defects and to improve the usual differential. The mechanism shown at Fig. 2 is the invention of Dr. William Luxmore of Chicago and eliminates the conventional divided rear axle, employing as it does a one-piece construction.

By means of a roller clutch in both rear wheels, operating in unison through the agency of a small connecting rod which works in a groove in the shaft, a positive two-wheel drive is stated to be obtained upon the application of power. Upon the car deviating from a straight line of travel the acceleration of the speed of the outer wheel releases the roller clutch. The wheel then runs free or ratchets ahead, and independently of the axle. The inner wheel, being engaged with the clutch, takes the entire drive, the reverse of the conventional differential gearing. Upon a return to the straight course, the outer clutch,

having been held in position by the controlling connector rod, is again engaged, and the wheel resumes its share of the drive. The operation of the clutch mechanism varies according to the variations in the line of travel, and the machines may be driven backward or forward. The inventor claims simplicity and durability, as the design eliminates many parts. Accessibility is a feature, as the clutch mechanism can be reached from the outside of the hub without displacing the wheel.

ROMEISER DIFFERENTIAL.

An ingenious arrangement for limiting the freedom of the differential gear is noted in the design by W. Romeiser, shown at Fig. 1. The differential proper follows conventional practise, but the right hand axle shaft is provided with a splined extension A and the left hand shaft carries an internally splined shell or sleeve B. Between the members A and B are plates C, these being normally held in contact by means of a coil spring D.

This clutch tends to cause the two axle shafts to rotate as a unit, but upon the car deviating from a straight line of travel, the clutch slips, allowing the differential to operate in the usual

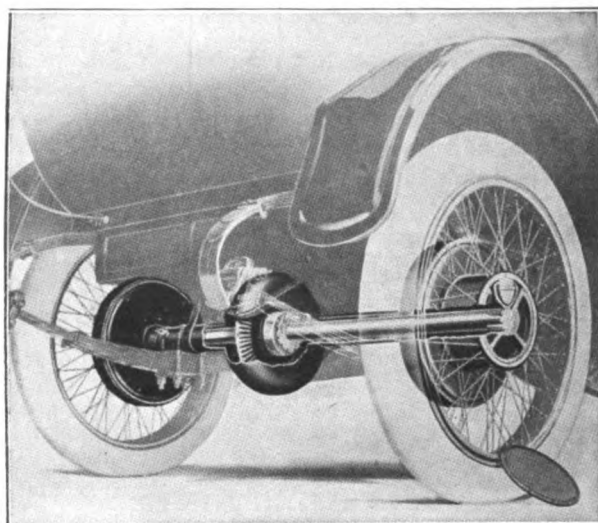


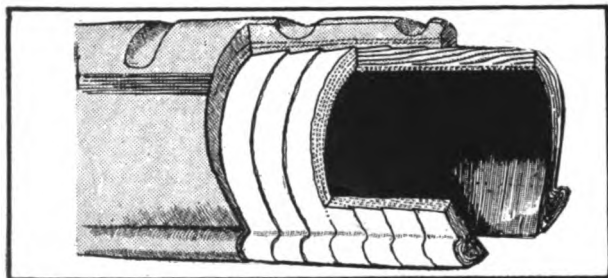
Fig. 2—Luxmore One-Piece Rear Axle and Differential Mechanism Utilizing Roller Clutch in Rear Wheels.

manner. From the design it may be deduced that the function of the clutch is to prevent a too free action of the differential.

PUTTEE TIRE HAS STRIPS WOUND HELICALLY.

A NEW type of motor car tire is being introduced in England by an accessory house which has given the casing its name of Harrods Puttee. It is stated to be of Australian design and manufacture and differs materially from conventional types, as will be noted by the accompanying illustration.

The usual method of building a casing by superimposing layers of fabric that extend the entire length and width is replaced by a system in which strips of fabric from three to four inches wide are wound helically over the shoe, the strips being set at an angle as shown, and overlapping each other for about five-sixths of their total width. All except four of the strips are brought down to and around the bead. Layers of rubber are utilized between the strips, amalgamating them with the tread and with each other.



Sectional View of Harrods Puttee Tire, an Unusual Type of Construction.

Many advantages are claimed for this peculiar construction, among which is that each strip, being a single unit, the tire is still entirely homogeneous, and external injury can affect none but the strips immediately damaged. It is stated that it is possible to replace one or more strips with new without impairing the efficiency of the casing or detracting from its appearance, and at a reasonable cost.

It is held that the overlap of the strips provides a fine foundation for retreads, which will adhere perfectly to the old casing by reason of the inter-fabric films of rubber, which provide a good contact.

VULCANIZING HINTS.

Goodyear Tire & Rubber Company Makes Some Practical Suggestions in Its House Organ.

In a recent issue of "No-Rim-Cut News", the house organ of the Goodyear Tire & Rubber

Company, Akron, O., some practical as well as useful suggestions are made in the department devoted to vulcanizing hints. The following are extracts from the publication:

"Vulcanizers are sometimes at a loss to explain why the gum does not flow freely, and presents a rough surface when taken from the cure. The most common cause of this difficulty we find to be the lack of sufficient pressure on the inside of the casing. When vulcanizers use steel coils in retreading it is important to wrap the tire very tightly in order to secure this pressure. The better method is to employ air bags instead of coils, because the air pressure forces the gum against the cross wrapping. For sectional repairs always use a sectional air bag. If the bag does not fit snugly it should be padded with strips of cured fabric.

"Under-curing of sectional repairs is often traceable to the condition of the molds. If they are clogged with dirt or if air pockets form, it takes longer to heat them, and consequently longer to cure the repair. Water sometimes collects in molds with the result that, while the pressure may be correct, the temperature will be too low to accomplish the cure in the prescribed time. Once a month you should disconnect the steam pipes and shoot a strong current of compressed air through the molds. A surprising amount of dirt will be dislodged by this process. There will be comparatively little trouble from this source if your molds have a drain at the lowest point where water is likely to collect, and a petcock at the highest point to allow trapped air to escape. In our repair department we keep this petcock open slightly all the time, to insure live, dry steam".

The number of causes for an intermittent miss of a cylinder is legion. One out of the ordinary is the failure of the valve to seat because of a gummed up valve stem. If caught upon the road with a valve stem in such condition the trouble may be corrected by cleaning the part with kerosene or gasoline, after which the stem should be lubricated with clean oil.

It is a good plan when purchasing a new machine to make a note of the manufacturer's number, that of the motor if marked, also the type or model. These data will not only be useful in ordering new parts, etc., but will be of value if the car be stolen.

SUGGESTIONS FOR THE NEW CAR OWNER.

Explaining the Strokes of the Four-Cycle Motor with Special Reference to the Model T Ford Four-Cylinder Engine.

(By C. P. Shattuck.)

The third installment of the serial on the construction, operation, care and repair of the model T Ford deals with the strokes of the motor, firing order of cylinders, etc. Owners of new automobiles who are not familiar with the poppet type of internal combustion engine will obtain much useful information from the data contained herein, as the principles involved are similar.

IT IS generally conceded that the modern gasoline engine is so perfected that it will give considerable service without attention other than renewing the supply of fuel and lubricant. This contention is borne out by the thousands of cars being operated by persons who have no other knowledge of the motor than that required for starting and stopping it.

There is another class of owners who ac-

each member of the different chassis groups, the faulty operation can be located quickly. Many troubles are closely allied, ignition and carburetion, for example, and many novices make the mistake of altering the adjustment of the carburetor when the trouble is due to the electrical apparatus, or vice versa.

Value of Knowing Motor.

To many the gasoline motor appears to be complicated, but if its principles be studied, and the function of each part and its relation to another be understood, it will be surprising how simple the construction really is. A thorough knowledge of the function of each component of

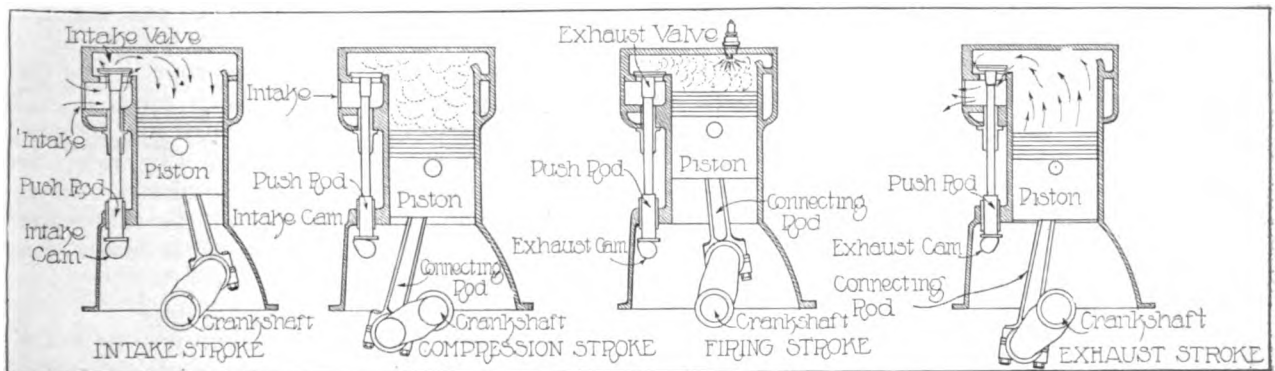


Fig. 3—Illustrating the Strokes of the Model T Ford Motor and the Position of the Intake and Exhaust Valves When the Cylinders Are Being Charged with Explosive Vapor, the Mixture Compressed, Ignited and Expelled.

quire by experience sufficient knowledge of the engine to remedy minor ignition and carburetor troubles, relying upon the expert repairman when an adjustment is necessary or an overhaul is needed.

The third group comprises motorists who study the principles involved, and this information, coupled with practical experience, enables them to successfully overhaul the chassis, as well as to correct troubles. The value of such knowledge is obvious. It not only gives the owner confidence, but reduces the cost of the maintenance of the machine to the minimum. And frequently the experienced operator by making a simple adjustment when on the road eliminates opportunity of serious trouble.

By familiarizing oneself with the function of

each group, the ignition system for example, is important, for it will enable one to locate the trouble quickly, thereby saving considerable time over the guess work method indulged in by some owners.

The writer holds that it is vitally important that the strokes, valve mechanism and timing of the motor should be well understood. Such knowledge will be invaluable on the road, as well as in the garage, for to rewire the ignition system without recourse to multi-colored wires and diagrams one must be familiar with the firing order of the motor and the proper position of the piston.

Strokes of Motor.

It has been explained that four strokes or movements of the piston of a four-cycle motor

are necessary to obtain one working impulse or power stroke. The strokes are defined as intake, compression, firing (power) and exhaust. The

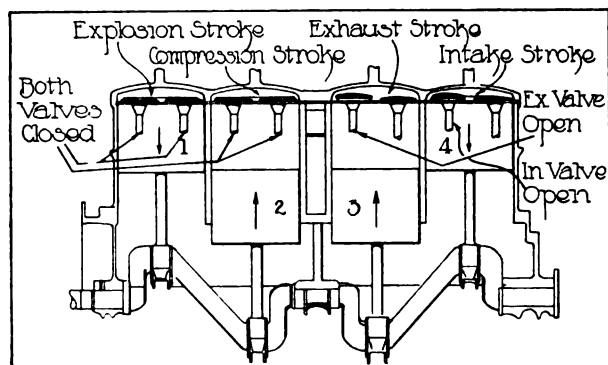


Fig. 4—Showing the Position of the Pistons During the Strokes—Note That Two Are Always Up When the Others Are Down.

mixture or explosive vapor is drawn into the cylinder by the suction of the piston on the intake stroke, during which impulse the piston moves downward. This operation will be made clear by reference to cylinder numbered 4 in the drawing at Fig. 4. The piston is at the top of the stroke or dead centre, and the intake valve, through which the mixture is drawn by suction, is open. In practise, however, this valve does not open with the piston on dead centre, but after the piston has started to descend, for reasons which will be explained later.

Intake Stroke Defined.

The intake valve remains open until the piston has descended and closes slightly after it attains its bottom position, which is termed the lower dead centre. The explanation of top and lower dead centres should be well understood, as it will be of value in the discussion on valve and ignition timing.

Compression Stroke.

Upon the piston completing its intake stroke, the intake valve closes. During this movement the exhaust valve is seated. With both valves closed the piston begins its upward or compression stroke, so-called because the piston compresses the mixture into what may be termed, for explanation, a small space. If the vapor were not thus compressed the explosion obtained would be weak. The principle is the same as with the explosion of powder. The more it is confined the greater the energy obtained from the combustion. The position of the piston and valves after compression is indicated at 2, Fig. 4.

Firing Stroke.

The mixture is now ready to be exploded by the electric spark provided by the ignition sys-

tem. Both valves are closed when the combustion occurs, and the expansion of the gases drives the piston downward (firing stroke) as the gases seek the path of the least resistance. The energy derived is due to the fact that three sides of the explosion chamber are rigid. A simple analogy is that of a muzzle loading gun, the motor cylinder being the barrel, the mixture the powder and the piston the bullet.

Both the intake and exhaust valves remain closed during the firing stroke, and the exhaust member is utilized to clear the cylinder of the burnt products of combustion. Upon the piston completing the stroke or downward movement, the exhaust valve opens, and upon the piston moving upward the gases are expelled or pushed out, passing through the exhaust pipe and muffler to the open air.

Valve Operation.

It will thus be seen that the valves are closed during the compression and firing strokes, and that the intake is open only during the charging of the cylinder and the exhaust when the burnt products are being expelled. The strokes are repeated as long as fuel is supplied and the mixture ignited by the electric spark, assuming, of course, that the valves function properly and that other components are in working order.

Referring to Fig. 4 once more, it will be noted that the pistons of the No. 1 and 4 cylinders are at top dead centre, firing and intake strokes respectively, and that the pistons in the second and third cylinders are down or at lower dead centre.

Crankshaft.

It will be understood that two pistons are always up when the other two are at lower dead centre. It is this point and the strokes that oc-

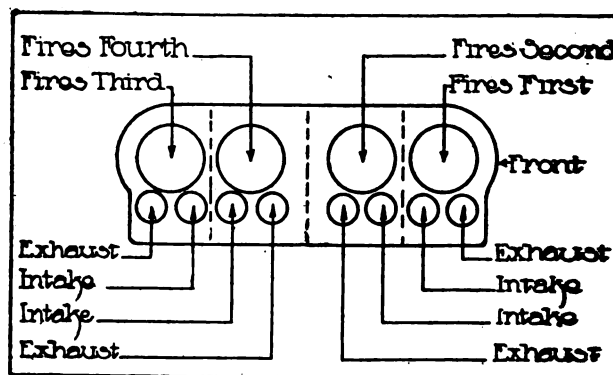


Fig. 5—Diagram Explaining Firing Order of Motor and Location of Valves.

cure in sequence in the first, second, third and fourth cylinders that are confusing to the novice. With the Ford motor the firing strokes of the cyl-

inders are separated, occurring in the following order: First cylinder fires first; second, second; fourth, third; third, fourth. The motor does not fire 1, 2, 3, 4, as is commonly supposed, because of the arrangement of the crankthrows of the crankshaft, as shown at Fig. 4.

The reason for arranging the crankthrows in this manner is to mechanically balance the working parts, for it should be borne in mind that three of the four strokes are idle; that is, they do not provide any energy. Those who have operated the car with one cylinder failing to deliver the impulse stroke, or missing as it is called, have noted the lack of power, and the decrease is more than would be the case if the faulty cylinder were entirely eliminated, because a certain amount of energy is required to overcome the resistance of the compression stroke of the next cylinder to fire.

Firing Order Defined.

The sequence of strokes is shown in an accompanying table and a careful study will enable one to know what the exhaust valve of the third cylinder is doing when the intake of the first cylinder is beginning to open.

Firing Order 1-2-4-3.

Cylinder 1	Cylinder 2	Cylinder 3	Cylinder 4
1—Firing	Compression	Exhaust	Intake
2—Exhaust	Firing	Intake	Compression
3—Intake	Exhaust	Compression	Firing
4—Compression	Intake	Firing	Exhaust

It will be seen that when the piston of the first cylinder is about to begin the firing stroke it is at top dead centre, as is that of the fourth cylinder, which is beginning the intake stroke. Pistons 2 and 3 are at lower dead centre, therefore they must be compressing and exhausting respectively.

With the table referred to it is an easy matter to determine the position of each piston and that of the valves. It will be noted that the proper sequence of strokes is observed irrespective of whether the table be read vertically or horizontally. It will also be seen that the impulse strokes occur every half-revolution of the crankshaft, or, in other words, four power strokes occur every two complete revolutions.

As previously stated, a knowledge of the strokes is very important, for it will enable one to rewire the timer of the motor and replace secondary cables without reference to colored wires or a timing diagram.

At Fig. 5 is a diagram depicting the arrangement of the valves, the construction and operation of which will be discussed in another installment.

(To Be Continued.)

HOLD SOCIABILITY RUN.

Event Under Auspices of Washington Section of Electric Vehicle Association a Success.

The first electric automobile sociability run of the Washington section of the Electric Vehicle Association of America was held recently and 54 cars competed. The run started from in front of the main entrance to the Smithsonian Institution and the 14-mile course was laid out through the Speedway and Rock Creek Park, the finish being at the Joaquin Miller cabin, where a basket luncheon was served. The run was a sealed event, each contestant endeavoring to cover the 14 miles, observing all traffic and speed regulations, within a secret time selected by a prominent government official. The course was covered in one hour and 30 seconds, and the



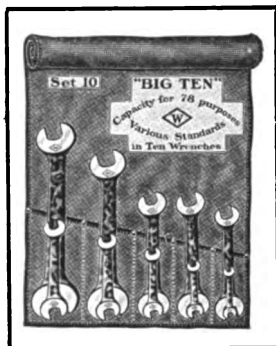
Electrics in Sociability Run Conducted by Washington Section of Electric Vehicle Association of America.

prizes donated were as follows: Silver picture frame, Washington section of the Electric Vehicle Association of America; silver cup, Emerson & Orme; electric teapot, J. J. Bartram; automobile clock, Dupont garage; inner tube, United States Tire Company; electric chafing dish, Potomac Electric Power Company.

A further truce of two weeks has been declared in the gasoline separator war between the City of New York and the dealers and garagemen. The garagemen and the Municipal Explosives Commission, which will conduct the prosecutions under the ordinance, were to have presented their cases before the Welfare Committee of the Board of Aldermen Friday, June 12, but the illness of the garagemen's chemist caused a postponement to Friday, June 26. Tests are being made by both sides together and separately and the garagemen, on the results obtained, have hopes of securing the repeal of the ordinance.

PRACTICAL TOOLS FOR THE REPAIR SHOP.

THE Williams "Big Ten" set, shown in the illustration, is the product of J. H. Williams & Co., Brooklyn, N. Y. It has a capacity for 78 sizes of most prominent nut, screw and set screw sizes in United States and other standard millings, and was designed to provide the maximum of service in the machine shop, etc. It is particularly adaptable to the garage and repair shop, as the wrenches fit A. L. A. M. and S. A. E. standard nuts and cap screws. The milled openings vary from .3125 inch to 1.4375 inches. The wrenches are constructed of the best material, and the roll shown comes at slightly extra cost.

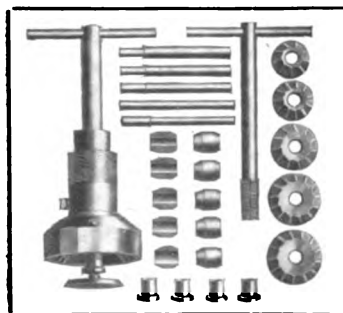


"Big Ten" Wrench Set.

FOSNACHT VALVE RESEATER.

The repairman is frequently called upon to reface and reseat the valves of a motor and it is important that this work should be performed accurately. H. G. Paro, suite 719, Michigan boulevard building, 30 North Michigan boulevard, Chicago, is marketing the Fosnacht valve reseating equipment, shown in an accompanying illustration. This tool has demonstrated its practicality in service, having been utilized in a large number of garages.

The maker calls special attention to the time and labor saving qualities of the tools, also to the fact that the equipment is such as to make possible the reseating of valves in a large number of motors, the size of the cutters being such as to accomplish general work. The maker claims great accuracy for the reseater and points out that valves may be placed in a perfect condition in considerably less time than with the usual methods. The tool is moderately priced and complete details and prices will be supplied the



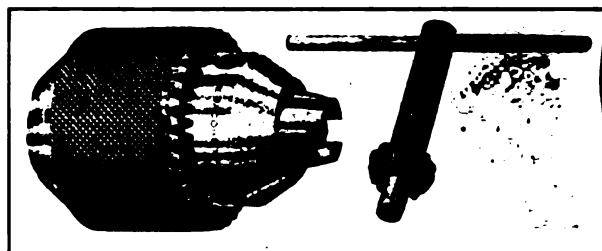
Fosnacht Valve Reseater.

trade upon the receipt of a postal card at the address previously given.

JACOBS DRILL CHUCK.

The Jacobs Manufacturing Company, Hartford, Conn., is marketing the Jacobs improved drill chuck, shown in the accompanying illustration, and the maker states that it possesses many advantages over ordinary types. In general form it is similar to the well known spanner sleeve chucks, but has a toothed sleeve and key which the manufacturer states makes for decided efficiency, as by the action of the key the initial or final adjustment of the drill is made easily and quickly by one hand.

The No. 3 chuck is shown, and it has a capacity up to .53125 inch. The total length of the jaws extended is 3.9375 inches, with jaws retracted, three inches. The outside diameter is 2.3125 inches, and its weight without the key is slightly over two pounds.



No. 3 Jacobs Improved Drill Chuck.

This type was designed to meet the demand for a convenient, accurate, durable drill chuck of the capacity above named, and is not only especially adapted and convenient for service in a lathe, but a hole may be bored through the chuck and spindle the size of its full capacity. It is also convenient for holding rod stock, etc.

One of the qualities of the Jacobs design is that it may be easily disassembled and assembled. It is taken apart by forcing the sleeve over the smaller or jaw end of the chuck, when the nut, which is made in halves, may be taken out, leaving the jaws free for removal. When the jaws are retracted, they extend into a recess in the sleeve, which makes it necessary that they be partially extended before attempting to displace the sleeve. The company manufactures a wide variety of these chucks and will supply complete details and prices upon request.

SPECIFICATIONS OF THE IDEAL MOTOR CAR.

(By C. E. Davis, S. A. E.)

AT THE semi-annual meeting of the Society of Automobile Engineers to be held at Cape May, N. J., June 23-26 inclusive, there will be presented on the third day a paper by C. E. Davis on the ideal car, it being the introduction of the discussion upon the subject. The future car for economy, luxury and business purposes will, in the opinion of Mr. Davis, be constructed in accordance with the following general specifications:

Design.

The car will have a harmonious streamline effect, utilizing substantial materials in the body, fenders, bonnet, radiator and wheels, combined in such a way as to eliminate molded surfaces, sharp corners, dust pockets, projecting hinges and handles; the head, side and tail lights being blended into the general outline, and the tool box, tire and luggage carriers concealed in dust proof compartments provided for in the body design. The wheelbase should be 128 to 132 inches for cars accommodating two to five persons.

Weight.

The car filled with gasoline, oil and water should not weigh over 2750 pounds. This can be accomplished without reducing the factor of safety below absolute security by employing a large percentage of pressed steel parts properly designed.

Stability.

The centre of gravity should be low and as near the centre of the car as possible, the weight being carried between axles.

Motor.

A four-cylinder valveless motor, 3.75 by 5.5 inches, carefully constructed to give reliable economic service under all conditions at speeds varying from 200 to 3000 revolutions a minute, and developing at least 60 horsepower at 2500 revolutions a minute. (No type of motor barred.)

Carburetor.

Optional. Sealed type desirable. To be located on the left hand side of the motor, close connected and properly water jacketed. If adjustable, dash or steering post regulator to be used.

Chassis.

To be low, not over 19 inches from the floor line to the top of the frame, with a road clearance of 10.5 inches. Frame to be of pressed steel electrically welded, without side bends and designed

to house the rear cantilever springs. A dust guard under the entire length to reduce wind resistance and dust raising.

Wheels.

Thirty-six by 4.5-inch wire wheels, with quick, detachable rims, using extra wheel or shoe as desired.

Brakes.

Two sets. As service brakes, one set of internal brake shoe type to act on all wheels to avoid skidding; one set of internal brake shoe type to act on rear wheels, only for emergency. Brake drums to be covered and as nearly dust proof as possible. All adjustments to be outside and easily accessible.

Springs.

Forward springs semi-elliptic and rear springs cantilever, all with wide, thin leaves to insure flexibility and easy riding. (If shock absorbers are used, they must have a time element to take the rebound, but be active on the down movement.)

Front Axle.

Sheet metal design, including steering knuckle and connections; central pivot knuckles, preferably of the caster type.

Rear Axle.

Sheet metal design, worm gear drive, 3.5:1 ratio, with worm under the axle. Torque and drive to be taken through tube with large end thrust ball; leather or rubber disc universal connection to propellor shaft, with suitable rod connections to insure proper spring action. The axle to be so constructed that thrusts for worm and gear are permanently fixed and at the same time easily dismountable for inspection. Total unsprung weight of rear axle, 200 pounds.

Gasoline and Oil Tanks.

To be located in dash cowl, with filler openings outside the car and easily accessible. Gasoline tank for pressure system to be divided, one part high for gravity feed on hills or starting in case pressure fails. Tank to be so vented that evaporation odors will be eliminated.

Steering Gear.

Standard worm and gear, locking type; cross steer preferred and adjustable to any desired angle.

Transmission.

If mechanical, four or more speeds forward and one reverse; either silent chain or gear. A

new petrol-electric transmission will give at least 10 speeds forward and one reverse. It will also have a charging section and serve as a starting and lighting outfit, operating in connection with a standard storage battery.

Control.

If mechanical, a single rocking central lever located well forward. A better method would be pneumatic or electric, operated by buttons. If petrol-electric transmission is used, a control box located on the steering post and designed to carry horn and light buttons is easily available.

Radiation.

Thermo-syphon with liberal radiator and piping.

Magneto.

High-tension.

Starting and Lighting.

The future type will be a flywheel combined generator and motor without revolving wires, requiring no auxiliary driving mechanism and capable of being easily disassembled, combined with a magneto connection similarly operated.

Lights.

Two side lights artistically mounted on fenders and movable to light sharp turns of the road. One tail light on the rear fender to light rear number plate. One centrally located headlight, having a deflector to either dim or turn lights in either direction to insure safety from glare when in the city or meeting cars on the road, and with a provision for lighting front number plate.

Horn.

To be mounted well forward either under or attached to fender and operated from the steering wheel.

Electrical Connections.

To be vari-colored wires or bars, thoroughly protected, easily mounted and traced by means of tool box chart.

Speed Indicator.

To be carefully housed and driven from propeller shaft, with double dial, one for the driver and one for the rear seat.

Tools.

Under front seat on driver's side.

Tires and Tubes.

To be carried in dust proof compartments in body behind rear seat.

Body.

To be designed on streamlines with fender, bonnet and cowl in harmony. Wide doors; deep low seats. French style of upholstery or air cushions, with plenty of room for long-geared people. Luggage to be carried under passenger's side of front seat, back of front seat and under rear seat in easily accessible, dust proof compartments.

No boxes or racks on the outside of the car or on the running boards. Concealed hinges and handles to insure a smooth outline.

Top.

To be a one-person operated, disappearing design to close tight for winter.

Bonnet.

To be of the inside concealed hinge variety similar to the Alexis Kellner design.

Windshield.

Vented, curved glass to conform to the cowls in such a way as to prevent back or overhead drafts.

Speed.

Car to be governed at a maximum speed of 50 miles an hour, and for touring purposes, 25 miles an hour, and adjusted to operate on direct gear for city work down to four miles an hour and to pick up to the maximum governed speed in 100 to 150 feet. With a four-speed mechanical transmission direct on third, third speed should cover all ordinary hills. With petrol-electric transmission, change of speed and power can be made without releasing clutch, and all changes are noiseless.

Noiselessness.

This is best obtained with valveless motor, silent chain transmission and worm gear axle. In petrol-electric transmission, with valveless motor and worm gear axle.

Durability.

The above combination, well cared for, should give eight years' satisfactory service so far as mechanism goes, and easily cover 120,000 to 150,000 miles, tires, of course, being excepted.

Accessibility.

The same careful study should be given to all details of the design that is applied to all machine designs. All parts should be easily accessible and removable with the simplest possible tools, either on the road or in the garage, and with no possibility of damage to upholstery or finish. All adjustments of brakes, carburetor and magneto to be easily reached.

Efficiency.

This is largely up to the driver. With careful handling an average of 20 miles to the gallon should be easily maintained.

Vibration.

If the car is properly built there will be no unpleasant vibration or noise to cause fatigue, even on the longest journeys.

In General.

The car ought to be marketed at a price not to exceed \$1500 and be good commercially from manufacturing, efficiency, economic, service and sales standpoints.

TENDENCY IN EUROPEAN CAR CONSTRUCTION.

(By Robert W. A. Brewer.)*

THE paper to be read by Robert W. A. Brewer, member of the Society of Automobile Engineers, at its meeting, dealt with the tendency in European car construction, and is as follows:

Body.

Cleanliness of design is only obtained satisfactorily by the elimination of flat surfaces presented either to the direction of motion or at the rear of the body. Streamline contour is carried out in a more complete manner than it is understood in the States, for greater attention is paid to the rear part of the body, as well as to the shape of the fenders. Seating capacity for four persons in a body width of about 44 inches, the backs of the seats reasonably high; that is, the seat cushions resting on the floorboards. The cowl so shaped as to merge with the wind screen set at an angle of about 45 degrees. This deflects the air current above the head of the occupants without imposing too great a wind resistance. The total head resistance, plus rolling resistance of such a body on a good, smooth road at 60 miles an hour, would be about 25 horsepower, and the motor, therefore, should develop about 36 horsepower on brake test at, say, 2000 revolutions a minute.

Motor.

Four-cylinder, high efficiency motors are far more popular than any other type. The six-cylinder motor has only a comparatively small field of adherents, and these are of the wealthier class. Anything between 80 mm and 90 mm bore, or even 95 mm, will cover the requirements. The ultra long stroke is disappearing. A good size would be 85 by 140 and it should easily develop the necessary power.

Gears.

Four forward speeds are necessary, direct on top. The gear ratio in the rear axle, 3.5 or four to one. This enables a very large range on top speed drive. The high rotational engine speed will provide the high car speed so long as the torque curve does not reach its peak.

Accessibility.

A modern motor being so reliable, accessibility is scarcely required, except to the carburetor and magneto. The former is preferably fed from

a fuel tank contained in the cowl, gravity supply to the carburetor itself, which is placed as high up as possible and often directly bolted to the engine casting. Personally, I prefer a special form of combined inlet and exhaust manifold, which gives a streamline flow, as with this manifold considerable fuel economy can be effected.

Control.

Right hand driving is universal with the gear levers in an enclosed gate. Throttle control by foot pedal with over-riding, hand-operated mechanism by small lever on the steering column.

Springs.

Semi-elliptic all round, with a tendency to the cantilever.

Efficiency.

It should be quite possible to get a brake mean effective pressure of 80 to 100 pounds a square inch from a modern engine. The compression ratio can be about 4.7 to one, but this depends on the contour of the combustion head. Such a motor should have no vibration, and when properly designed and made, runs equally smoothly at all speeds up to 2500 rpm. Pressurized lubrication to all the crankshaft bearings is essential. If the clearances are suitably made, there should be no signs of metallic contact on the big end bearings. This can be carried out quite easily in practise. Lightness of reciprocating parts is essential.

S. A. E. SECTION FOR CLEVELAND.**Prominent Men Endeavor to Organize Automobile Designers into a Branch Society.**

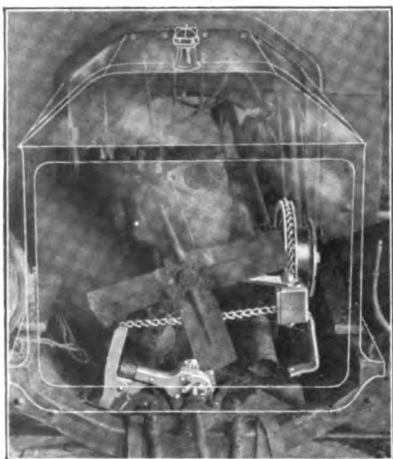
Organization of Cleveland automobile designers into a branch of the American Society of Automobile Engineers is the aim of a committee appointed at a recent meeting of workmen interested. The committee includes W. R. Strickland, R. W. Nightingale, A. S. Scaife, Christian Girl and J. H. Hertner, all connected with the industry in Cleveland.

There are nearly 100 designers in Cleveland's automobile factories, and the city is the geographical centre for 800 members of the national association. The organization of a branch would facilitate matters and bring about better results according to local members.

*Consulting engineer, London, England.

NEW LINES FOR THE GARAGE AND DEALER.

THE Universal Manufacturing Company, Racine, Wis., is marketing the Universal hand Ford starter, shown in the accompanying illustration. It is a new style of mechanical motor starter, and the maker states that it can be installed in a very short time without alterations to the car. It is operated by a handle located in the toeboard and convenient to the driver. It is stated that

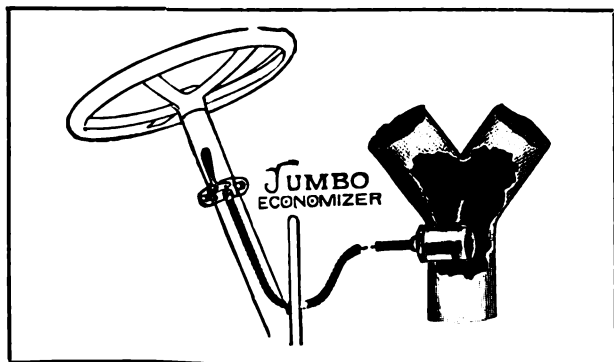


Universal Ford Motor Starter.

the leverage obtained by a slight pull of the handle is so powerful that the device can be operated by a child. The Universal starter obtains a half revolution of the crankshaft, instead of the usual quarter turn, when cranking by hand. The material and workmanship are first class in every respect. The Universal starter is not only moderately priced, but is guaranteed. The company will supply complete details and dealers' proposition on request.

JUMBO ECONOMIZER.

E. Edlmann & Co., 227 West Illinois street, Chicago, is marketing the Jumbo economizer, shown in an accompanying illustration, and it is sold on a money-back guarantee. It increases the power of a motor because of the additional air ad-



Jumbo Economizer Controlled from Steering Column.

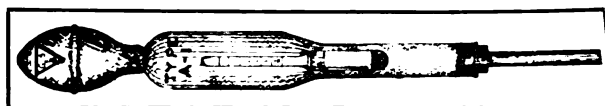
mitted to the intake manifold above the carburetor, and makes for economy in that maximum efficiency is obtained from the fuel burned.

One of the qualities of the Jumbo is that the amount of air admitted is controlled from the seat, a lever being attached to the steering column. This enables the driver to regulate the air supply as best meets the requirements of the motor.

The Jumbo is stated to be easily installed and it is added that the work does not require the services of an expert. It retails for a moderate price and the company has a special proposition for dealers, garages and repairmen, which will be forwarded upon request. The concern is issuing a bulletin on desirable accessories and invites the trade to write for the same.

TYPE A-1 HYDROMETER SYRINGE.

The majority of owners who store their machines at the public garage rely upon the attend-



Scientific Type A-1 Hydrometer Syringe.

ants to give the cars the attention needed. With the electric lighting and motor starting systems it is important that the storage battery be given that attention recommended by the maker. The density of the electrolyte denotes whether the cells are charged or discharged and the best method of ascertaining its condition is to take a reading, for which purpose a hydrometer is utilized.

The General Scientific Equipment Company, 2000 Market street, Philadelphia, maker of scientific instruments, is manufacturing the type A-1 hydrometer syringe shown in an accompanying illustration. By it it is a simple matter to withdraw sufficient electrolyte from each cell of the battery and note its density, as the hydrometer proper is enclosed within the tube containing the solution taken from the battery.

This enables a correct reading and prevents waste of the fluid. One of the qualities of the design is that the hydrometer floats freely in the electrolyte, insuring accurate readings. The retail price of the unit is moderate. Prices will be supplied upon request.

TO LESSEN COST OF FOOD.**Rate of Haulage by Road Vehicle Decreases,
While Freightage by Rail Increases.**

The National Chamber of Trade held its annual conference in Blackpool, England, recently. The president in his address commented upon the high price of food, which is mainly responsible for labor agitation, and the problem of increasing home supplies, and that it will engage the attention of the British government. He also referred to the growth of motor traction as promising cheaper food. "Much more use might be made of motor vehicles for hauling by road, and the state should take up at once the matter of providing and maintaining suitable roads for that traffic.

"While the cost of haulage by road has been reduced from one-third to one-half by the development of the motor vehicle, as shown by the American National Automobile Chamber of Commerce, and can be reduced further by the building of good, durable roads, the cost of transportation by rail has nearly doubled in the last 15 years. An investigation by the Lehigh Valley railroad shows that freight cars and locomotives cost more than twice as much now as in 1890, and that the cost of hauling freight was 46-100ths of a cent per car-mile 15 years ago as compared with 98-100ths at the present time.

"Motor trucks can deliver directly from farm to hotel, restaurant, or retailer the same day or the morning after farm produce is gathered, without any rehandling or delay, and therefore in better condition than under present systems, and can save to the consumer a large part of the commission men's charges and cartage costs, which often add 100 per cent. to the cost".

COMPLETES TOUR OF COUNTRY.**Sales Manager Warner of Oakland Company
Finds Business Good in All Sections.**

That the recent financial depression has been completely dissipated and that the 1915 season will see wonderful results attained in the automobile industry is the assertion of Fred W. Warner, general sales manager of the Oakland Motor Car Company.

Mr. Warner is in a position to speak authoritatively on the subject, for, having just returned from a tour of the Southwest, he has completed the last of a series of trips covering the entire

country. His purpose was to learn, first hand, conditions throughout the country and to become personally acquainted with the members of his organization. Mr. Warner says:

Our own records proved to us that there was no truth in the reports that the automobile industry was about to "break", and we were convinced that the condition was only temporary. Our 1914 sales record shows that we were not mistaken and, moreover, there are also many other automobile manufacturers who have met with success. This is true not alone of the motor car industry, for I have found that business throughout the entire country is on a safe and sound basis.

In the Southwest, the farmers, who as a class have a greater influence upon the financial condition of the country than any other body of men, are all prosperous, and this one fact is indicative of general prosperity.

AMERICAN HIGHWAY ASSOCIATION.**Fourth American Road Congress to Be Held at
Atlanta Nov. 9 to 14.**

I. S. Pennybacker, executive assistant of the American Highway Association, has just returned from Atlanta, Ga., where plans were completed for making the Fourth American Road Congress, Nov. 9 to 14, the most successful and striking convention ever held in the country. Arrangements have also been made for the greatest government exhibit, and the city itself is to be turned over to the visitors from all parts of the country. The movement for better roads in the United States is expected to reach its climax at Atlanta and the new government-maintained highway from Washington to Atlanta will be ready for the tourists who will attend the convention.

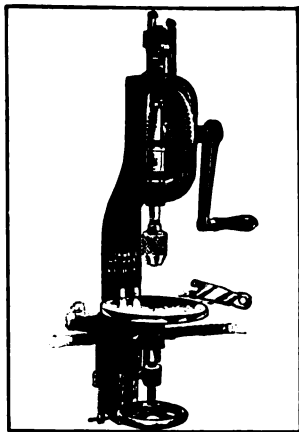
Charles P. Light, business manager of the American Road Congress, will leave for Atlanta within the next few days and will take charge of the arrangement of exhibits for the coming Road Congress and especially of the allotment of space for the exhibitors.

Hon. A. B. Fletcher, president of the congress and state highway engineer of California, and Hon. L. W. Page, president of the American Highway Association and director of the United States Office of Public Roads, are taking a deep and active interest in the success of the congress.

Electric Lighting may be said to be standard equipment on the modern automobile. As the efficiency of the system depends largely upon the storage battery, it is essential that it be given attention. This important subject will be fully discussed in the Eighth Annual Touring Number of The Automobile Journal, which will be issued on July 10.

POWER AND HAND DRILLING MACHINES.

MANY small repair shops whose capital is limited, as well as some concerns starting in business, do not feel able to invest in power



No. 1003 Yankee Drill.

drills and rely upon manually operated equipment. The North Bros. Manufacturing Company, Philadelphia, is producing what is termed the Yankee bench drill, which was designed to meet the conditions above referred to. Two types are produced, the No. 1003 being shown in an accompanying illustration.

It is made with one speed only, and being geared 49:14, one turn of the crank gives 3.5 revolutions to the spindle. The latter is of steel, .375-inch diameter, and all gears have teeth of extra strength. They are cut from solid stock and run smoothly and accurately. The pinion is of steel.

A small lever on the arm to the left of the spindle locks it fast to open and close chuck. The chuck is of steel, 1.75 inches long, one inch in diameter, and has three jaws of hardened tool steel. It is nickel plated and polished, and holds round shank drills up to .25-inch diameter inclusive.

The traverse of spindle (automatic feed) is 1.5 inches. The friction feed brings to and from the work quickly and the ratchet feeds automatically all drills from No. 54 to .25-inch without danger of breaking. The frame is finished in dead black. It comes neatly packed in a wooden box and the gross weight is 20 pounds. The No. 1005 drill is the same as the one described, but is made stronger, being designed for heavier work. Complete details and prices will be supplied upon request.

PRENTICE DRILLING MACHINE.

The Reed-Prentice Company, Worcester, Mass., maker of lathes for motor cars and general work and drills, is manufacturing the Prentice 20-inch upright drilling machine, shown in the accompanying illustration. It is of the sliding

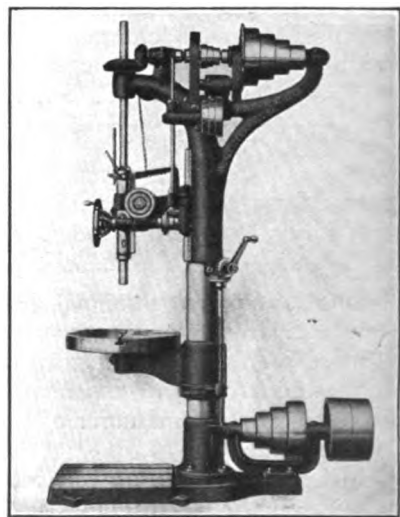
head type, is equipped with back gears, and with a combined belt and worm driven power feed. This power feed may be disengaged automatically by means of an adjustable stop on the spindle quill tripping a mechanism and allowing the driving worm to drop out of mesh.

Counterbalance May Be Varied.

Both the spindle and the head are counterbalanced by the same weight, and the sensitiveness of the counterbalance may be varied to suit the case by merely moving the chain along the notched lever. The sliding head is securely gibbed to a wide way on the column and is stated to be very rigid when drilling. Crucible steel is used in the construction of the spindle, which is provided with a ball thrust bearing. It is possible to drill to any point on the surface of the table which, in addition to swinging around the column, may be rotated about its own centre. The base is of ample proportions and the column is rigidly bolted to it.

Specifications.

The specifications are as follows: Distance from column to spindle centre, 10 inches; maximum distance from spindle to base, 48 inches; maximum distance from spindle to table, 30 inches; vertical traverse of table, 21 inches; vertical traverse of head, 12 inches; vertical traverse of spindle, 7.5 inches; hole in spindle, Morse taper No. 3; largest cone diameter, nine inches; diameter of spindle, 1.375 inches; diameter of table, 16 inches; driving pulley dimensions, nine by 2.75 inches; speed of bottom shaft, 240 revolutions a minute; total height of machine, 76 inches; floor space, 44 by 18 inches; width of cone belt, 2.25 inches; cubic feet, 38. Prices and additional information will be forwarded upon addressing the company.



Prentice Upright Drilling Machine.

KNIPPER TO PILOT DELAGE AT SIOUX CITY.

WITH the winning car of the 1914 Indianapolis speedway race, two Peugeots and a strong field of American machines, the 300-mile race to be run at Sioux City, Ia., on the Fourth of July should be a warmly contested event. When the entry list closed there were 26 nominations for the \$25,000 purse, which will be contested for over the two-mile dirt track. Billy Knipper will pilot the Delage with which Rene Thomas won at Indianapolis, and Goux's Peugeot will have Bob Burman at the wheel, L. C. Erbes of Minneapolis, Minn., having bought the car and will back Burman for the balance of the season. The cars and drivers are as follows:

Stutz, Anderson; Stutz, Oldfield; Beaver Bullet, Keene; King, Kline; Mercer, Wishart; Braender Bulldog, Chandler; Marmon, Patschke; White, Shrunk; Chalmers, Wetmore; National, Bauer; Ray, Brock; Stafford, Callahan; Peugeot, Stringer; Chevrolet, Le Cain; Duesenberg, Haupt; Duesenberg, Rickenbacher; Sunbeam, Babcock; Metropol, Horan; Moon, Cailloutte; Mason, not named; Peugeot, Mulford; Gray Fox, Wilcox; Peugeot, Burman; Delage, Knipper; Chevrolet, not named.

TACOMA HAS GOOD LIST.

Over 20 Entries Received for Speedway Races, July 3 and 4—Track Reported Fast.

Arrangements are complete for the speedway races at Tacoma, Wash., July 3 and 4, and up to the present time over 20 cars have been entered. A number of well known drivers are expected to race, including Tetzlaff, Earl Cooper, Hughes, Pullen and Carlson.

The big event will be the free-for-all, in which there will be no restrictions of any kind on the cars. The prize is \$5500 and a perpetual challenge trophy. A cash prize of \$3500 and a perpetual challenge trophy will be put up for a 200-mile race for cars with piston displacement limit of 600 cubic inches. A 100-mile race for Washington, Montana, Oregon, Idaho, British Columbia and Alberta drivers, non-stock cars of 450 cubic inches piston displacement, completes the card.

BARNES STARS AT PORTLAND.

Driving an Eight-Cylinder Romano Special He Wins Leading Events.

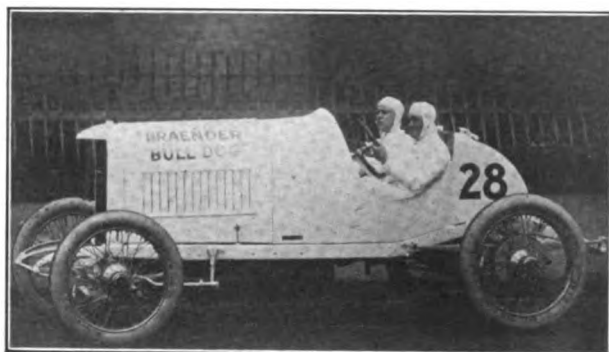
Percy Barnes, driving an eight-cylinder special Romano, was the star at the two-day race meet held at Portland, Ore., June 13 and 14. He won the 25-mile race in 25 minutes and 40 seconds and the 15-mile event in 14 minutes and 35

seconds. In the elimination trials he circled the track in 55.4 seconds. Barnes also won the 40-mile event by four laps, his time being 41 minutes and 50.6 seconds. Welch in a Mercer won the 20-mile race in which A. J. Edwards and his mechanic were badly injured.

BRAENDER "BULLDOG".

Entered in the Sioux City Event by the Braender Rubber & Tire Company.

The Braender Rubber & Tire Company, Rutherford, N. J., has entered the Braender "Bulldog", shown in accompanying illustration, in the Sioux City event scheduled for July 4. The



Braender "Bulldog", Entered for Sioux City 300-Mile Race.

machine will be piloted by William Chandler, who drove it in the recent Indianapolis race. The car will be equipped with Braender tires, which have made such an enviable reputation in other races.

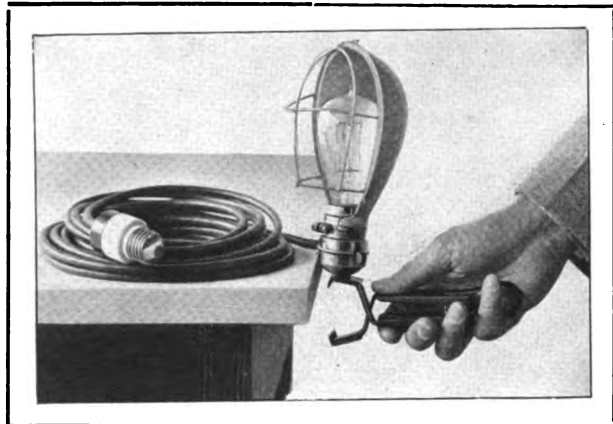
ISSUES NEAT BOOK.

Gray & Davis, Inc., Publishes "A Little Journey Through a Great Factory".

Gray & Davis, Inc., Boston, maker of the well known electric lighting and motor starting systems by that name, is publishing for private distribution a very neat book, entitled "A Little Journey Through a Great Factory". Over 40 pages are devoted to views of the factory, these showing the progressive steps in manufacturing the lighting and motor starting system. The various offices, etc., are also illustrated. A high grade coated paper is employed, and the illustrations are unusually clear and distinct. The book is well bound.

LABOR SAVING EQUIPMENT FOR THE GARAGE.

AN ALL around light is necessary in the garage and repair shop, and one of this type is being manufactured by R. S. Mueller, 425 High



Mueller Clamp Light, Having Adjustable Jaws, Polished Reflector and Ample Length of Cord.

avenue, Cleveland, O. The Mueller clamp light shown herewith consists of a socket with combined reflector and guard, mounted on a clamp of special design. The jaws of the last named member have a spread of 2.125 inches and may be easily and quickly applied to a bench, pipe, rod, spoke, fender, etc.

GREENERD ARBOR PRESSES.

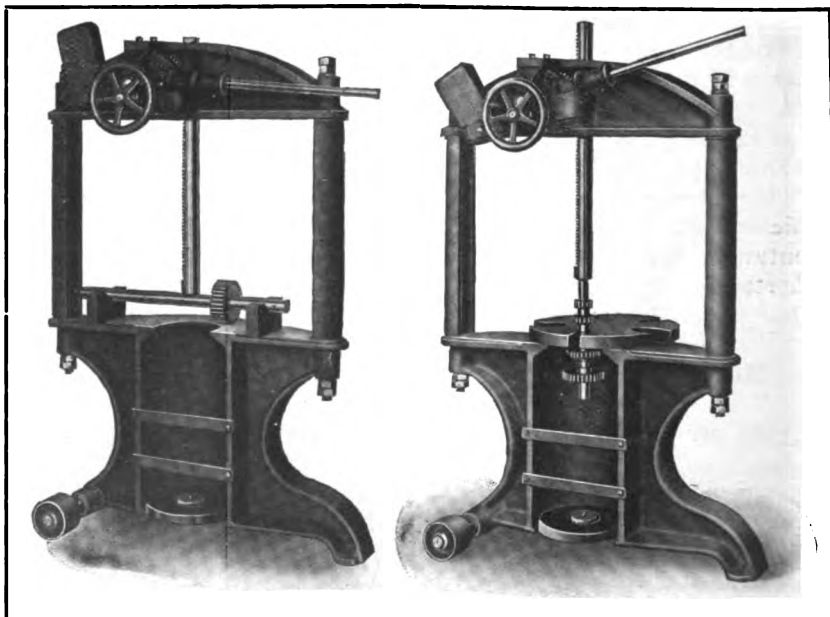
One of the most practical and useful units of the machine equipment in the garage, repair shop and service station is an arbor press which can be employed for a number of purposes. For example, the old fashioned method of removing a transmission gear from its shaft is to utilize a sledge hammer, a practise that not only runs up a labor bill for the owner, but is likely to result in damage to the shaft. Removing flywheels, straightening axles, etc., which frequently require a pressure of several tons, is easily and quickly accomplished by the arbor press.

The Edwin E. Bartlett Company, 322 A street, Boston, has been making a specialty of arbor presses for years and the product of this concern

is well and favorably known among the machinery and manufacturing trade. The No. 15 Greenerd shown in the accompanying illustration was designed especially for garage work, and the maker points out that it will repay its cost in a short time and that it will build up trade, in that the cost of labor to the owner is considerably reduced by its use. The press is easily handled and the ram can be quickly run up or down by a small hand wheel in front of the machine.

The press provides 36 inches between the uprights, has a 12-inch opening under the plate, 26 inches over the plate and 48 inches over the lower or auxiliary plate. Being mounted on wheels the press can be easily moved to the centre of the shop to straighten an axle, or over a trap hole through which a crankshaft may be placed to remove a flywheel. The auxiliary plate at the bottom of the chamber under the revolving plate, having a receding centre and a self-conforming surface to press against, makes it very convenient when needed. This plate is removable.

The gearing is all of special heat treated steel, and vanadium is used in gears subject to the greatest stresses. One man can exert a pressure of 10 tons and two men, 16. The workman is able to "feel" what he is doing, therefore a pressure gauge is not needed. Greenerd arbor presses are built to endure and the No. 15 weighs 1300 pounds. The company makes 15 sizes. Complete details will be mailed upon request.



No. 15 Greenerd Arbor Press Especially Adapted to Motor Car Repairing, Etc.

AMERICAN AUTOS IN AUSTRALIA.

Low Priced Cars Meeting with Much Success —Farmers Are Buying in Large Quantities.

At present in Australia business is booming; in fact, it is a record year of prosperity. Every ambitious farmer or land owner is making money. In the northern part of New South Wales there is a number of small land owners who in previous years were merely making a living, but today they are fast becoming independent. It is with this class of people that the automobile trade is doing its greatest business.

These men cannot afford to pay for a high priced car, but with the coming of the American low priced car they are fast becoming automobilists.

The small car or cyclecar is meeting with success only in the city and chiefly among medical men. It does not seem that they are to be popular at present in the country districts, as the condition of the roads will not permit their being successfully used.

Business is progressing by leaps and bounds with at least three well known low priced American made cars. One of these makers is selling three times the number of cars he did a year ago. The higher priced American made car is not meeting with such success in Australia as it did a year ago. There appears to be a good market for a light, economical, popular priced automobile.

ANNUAL ELECTRIC VEHICLE SHOW.

Manufacturers Making Preparations for the Big Display, Oct. 7-17, in New York City.

The electric vehicle show, which is to be held the coming fall in New York City, already has four prominent makers who are desirous of exhibiting their cars. Although it is some months hence, these manufacturers want to make sure that their space will be reserved. They are the General Vehicle Company, the Ward Motor Vehicle Company, the Anderson Electric Car Company and the Walker Motor Vehicle Company.

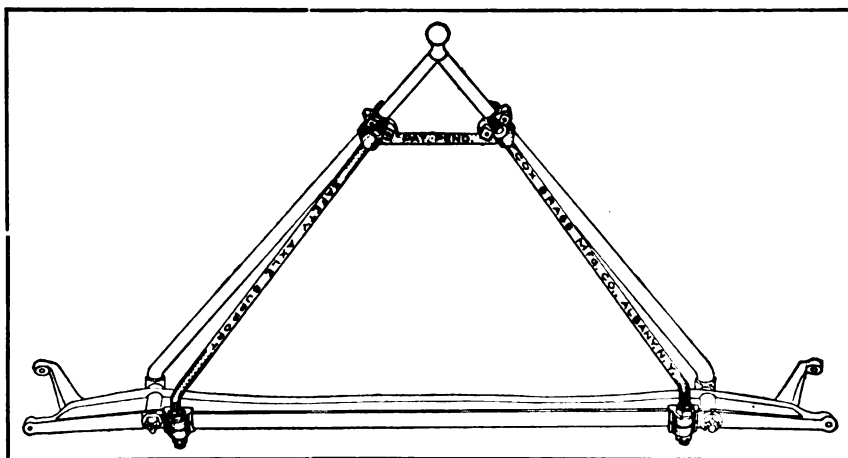
The show will be held in Grand Central Pal-

ace, Oct. 7-17, under the direction of Charles Parker of the New York Edison Company.

NEW SAFETY AXLE.

Cox Brass Manufacturing Company Brings Out Axle and Radius Rod Support for Ford Car.

The Cox Brass Manufacturing Company, Albany, N. Y., maker of motor car specialties, has brought out an entirely new accessory for the model T Ford car. The Cox safety axle and radius support embodies "Safety First", the popular phrase of the day. The maker states that owing to the construction and design of the Ford front axle, the triangular radius rod being supported or connected above the centre, it has a tendency, on rough roads at rapid speed, to tilt or bend the axle toward the back.



Cox Safety Axle and Radius Rod Support for Model T Ford Automobiles.

The Cox device increases the rigidity of the car, and is stated to make driving much easier. It insures safety, as it provides a double truss support. As will be noted by the accompanying illustration, which depicts the device fitted to a Ford axle and radius rod, there are no holes to drill or alterations to make. An adjustable, movable clamp is utilized to connect the Cox device to the front axle, and it has an additional advantage in that it may be employed to line up the front wheels. The rear extensions and cross member are secured by clamps to the radius rod just back of the ball member, as shown. It is obvious that the design greatly adds to the sturdiness of the structure. The Cox safety axle and radius rod support is moderately priced and is constructed with the same high grade material and careful workmanship for which the products of this concern are noted. Complete details and prices will be forwarded upon request.

NEWS OF THE MANUFACTURER AND DEALER.

The following concerns have been incorporated recently to manufacture or deal in automobiles, accessories, etc.:

Hunter-Dammel Motor Car Company, Cincinnati, O.; \$5000.

Kuapp Motor Corporation, New York City; \$10,000; H. Hughes, T. G. Jenkins, E. B. McKellar.

Lynn Motor Cycle Company, Lynn, Mass.; \$2500; to deal in automobiles; Earl M. Lawrence, Fred A. Pratt, Ralph W. Reeve.

Long Ford Auto Company, Biddeford, Me.; \$150,000; J. H. Pierce, R. O. Brewster, D. W. Snow.

Clemens & Grell, New York City; \$5000; to deal in automobiles, motor boats, etc.; Otto Grell, Joseph Clemens, J. E. Smith.

H. J. Lupton Truck Company, Detroit, Mich.; \$25,000; to deal in commercial cars; Harry J. Lupton, Elmer J. Richmond, Asa B. Haseltine.

Liverpool Motor Car Company, East Liverpool, O.; \$10,000; to deal in automobiles; C. R. Larkin, S. J. Norton, H. A. McClain, Migarry Camarda, A. G. Ellis.

Tomberg Auto Company, Brooklyn, N. Y.; \$1000; to deal in automobiles; William P. Flinn, Salim Barson, Christiania Tomberg.

C. L. Fitzgerald Motor Company, Newark, N. J.; \$125,000; to deal in automobiles; C. L. Fitzgerald, William J. McAvoy, A. D. Rawson.

Cadillac Automobile Company, Boston, Mass.; \$100,000; to deal in automobiles; Albion L. Danforth, Bertha K. Danforth, J. James MacGregor.

Winslow Automobile Company, Fort Smith, Ark.; \$5500; to deal in automobiles; L. F. Brock, R. N. Winslow, S. L. Williams.

Lawson-Pratt Sales Company, Boston, Mass.; \$5000; to conduct an automobile business; D. Lawson, R. T. Pratt, E. B. Stanwood.

Merkel & Spacher, Rochester, N. Y.; \$15,000; to conduct a bicycle and motorcycle business; C. A. Merkel, Joseph G. Merkel, George M. Spacher.

Bantam Manufacturing Company, Boston, Mass.; \$200,000; to manufacture motors; Frank J. Tyler, Lucius S. Tyler, Harry L. Burrage.

Eagle Motor Company, Los Angeles, Cal.; \$100,000; Eugene W. Jump, P. O. Gordon, Charles E. Strong.

Federal Manufacturing Company, Inc., Nashville, Tenn.; \$100,000; to manufacture automobile wheels, parts and accessories; J. L. Dann, J. R. Tubb, B. B. Coffey, G. A. Puryear, William Hume, Jr.

Sampson Engineering Company, Louisville, Ky.; \$350,000; to manufacture automobile starters.

Harrison Motor Company, Boston, Mass.; \$10,000; H. B. Chessman, D. F. Collins, G. L. Ware.

Spool Valve Motor Corporation, Minneapolis, Minn.; \$50,000; to manufacture gasoline engines; L. B. Bird, C. H. Lundgren, J. E. Tappan.

Ashley Wire Wheel & Rim Company, New York City; \$50,000; to manufacture wire wheels; R. W. Ashley, F. W. Kolb, C. Gaschott.

Ball & Roller Bearing Company, Danbury, Conn.; \$100,000; Lewis Helm, J. H. Roth, William C. Barrett.

Springfield Valve Company, Springfield, Mass.; \$100,000; R. M. Keating, B. J. Griffin.

Masco Manufacturing Company, Detroit, Mich.; \$20,000; to manufacture steering gears.

Milwaukee Steel Products Company, Milwaukee, Wis.; \$25,000; to manufacture motor car and engine parts, etc.; A. R. Marggraf, E. M. Dougherty, Nicholas Kies.

Lombard Tractor Company, Waterville, Me.; \$250,000; to manufacture and deal in tractor engines; S. W. Lombard, A. C. Lombard.

Shea's Market, Lake Placid, N. Y.; \$50,000; to deal in automobiles, etc.; H. D. Hayford and others.

Empire Electric Vehicle Company, Wilmington, Del.; \$200,000; to deal in automobiles.

Lake Auto Company, Raleigh, N. C.; \$25,000; to deal in automobiles, etc.

John Dickens Company, North Paterson, N. J.; to deal in automobiles; Anna Dickens, John Dickens, Ellen Farley.

Barter & Longtin, Watertown, N. Y.; \$5000; to deal in automobiles and motorcycles.

Union Automobile Service Company, Detroit, Mich.; \$4000; to deal in automobiles.

Fred G. Rinker Auto Company, Indianapolis, Ind.; \$1500; to deal in automobiles; Fred G. Rinker, Charles V. Kinney, Charles F. Redding.

Graham Automobile Company, Chicago, Ill.; \$2500; to deal in automobiles; Charles E. Graham, A. S. Robertson, N. J. Shupe.

Southern Cyclecar Manufacturing Company, New Orleans, La.; \$10,000; to manufacture cyclecars.

Gary Auto Manufacturing Company, Gary, Ind.; \$50,000; to manufacture automobiles; George E. Paft, L. G. Throckmorton, William C. Flanagan.

L. & M. Manufacturing Company, Chicago, Ill.; \$10,000; to manufacture automobiles and accessories; Charles A. Larson, Louis Teuber, Iven Thorsell.

White American Locomotive Sander Company, Roanoke, W. Va.; \$75,000; to manufacture automobiles and trucks; W. H. White and others.

Kilgelsmith Electric Truck Company, Portland, Me.; \$300,000; to manufacture electric trucks.

Dequindre Auto Repair Company, Detroit, Mich.; \$5000; to deal in automobiles; Russell A. Lutes, Albert C. Glassner, Hugh M. Edwards.

Lomar Motor Car Company, Chicago, Ill.; \$1,000,000; to manufacture automobiles.

Republic Vulcanizing & Welding Company, Louisville, Ky.; \$5000; to repair automobiles and machinery; A. L. Rolli, Carl A. Tschanz.

Fordham Garage Company, Bronx, New York City; \$2000; to conduct a garage; Vincent DeMeo, Albert DeMeo, Nathan Levy.

Manchester Auto Garage Company, Manchester, N. H.; \$30,000; to conduct a garage; William C. Spear, William G. Berry, George H. Bammann, Edwin F. Jones, Robert L. Manning.

Case Garage Company, Fresno, Cal.; \$25,000; to conduct a garage and repair shop; O. L. Everts, F. G. Logan, H. L. Gepford.

Auto Truck Garage Company, New York City; \$50,000; to deal in trucks and conduct a garage; Alexander C. Brach, Henry J. Benjamin, Harry B. Emblem.

GARAGE AND DEALER.

Ray Worrall, Lebanon, Penn., has purchased the Commercial garage on Church street.

R. K. Johnson, Benson, Minn., has purchased the garage and equipment of Walter Harding.

Edward McShane, La Porte City, Ia., has sold his interest in the La Porte City garage to his partner, who will conduct the business.

C. G. Dourte, Swea City, Ia., has purchased the Bert Ley garage and will operate it.

R. J. McClure, Whitestone, N. Y., has purchased the interests of Joseph Daly in the Seventh Avenue garage. He will operate it in his own name.

William Ludwig, Bellaire, O., has taken over the Bayha garage on North Belmont street. He has been in the automobile business for some time.

Randolph Seavey, Hampstead, N. H., has purchased the Central Street garage at Derry, N. H., and will operate it.

U. G. Davis, Allenhurst, N. J., has purchased the garage formerly owned by Johnson Brem and has taken possession.

Wright & Wilson, Outlook, Mont., has sold its garage to George Simonet, Crosby, N. D., who is now making extensive improvements on it.

John Hinsler, Canby, Minn., has purchased the garage and repair shop of Anderson & Beshears. He will conduct the business as formerly.

The Cannon & Co. Garage, Belding, Mich., has been sold to Fred and Roy Lypps, who will continue the business. It was formerly owned by Richard Cannon and W. R. Cannon.

Louis H. Eisenlohr, Philadelphia, has purchased the garage at 424 Ludlow street.

The Houk Wire Wheel Company, New York City, of which J. Edward De Mar is the manager, will open a retail store at the corner of 58th street and Broadway.

The W. & H. Auto Repair Company, Indianapolis, is a new automobile repair and rebuilding plant which was opened recently. The firm is located at 620 East Minnesota street and has an establishment that is modern throughout.

John Osborne, Salt Lake City, of the Osborne Auto Tire & Supply Company, has opened a garage at 34 First street, to be known as the Eagle Gate garage. The Osborne company will remain in business.

The Auto Repair Company, Winston-Salem, N. C., is a new company formed recently, comprised of R. L. Brinkley, G. C. Jarvis and Orville Masten. The firm will conduct a repair business in the Nading building at the corner of Seventh and Trade streets.

Helmsmiller Bros., Hawkeye, Ia., has opened a new garage and repair shop. It is modern throughout.

Reid & Layne, Santa Monica, Cal., has opened its new garage, which has just been completed. The building is of brick and cement construction and cost \$25,000.

Roy Lampman, Pownal, Vt., has opened a first class garage at Pownal Center. A repair shop will be operated in connection with the garage.

The S. & S. Garage, Reading, Penn., has been opened by E. W. Schuhmann and Edward Smith at the corner of Spruce and Plum streets. The company is agent for the Falcon cyclecar and will carry oils and supplies.

W. O. Carlem and V. Schulz, Stockton, Cal., automobile ignition specialists, have opened a shop at 222 North Hunter street. The firm makes a specialty of overhauling and repairing magnetos, coils and electric starters.

The Cresson Motor Car Company, Cresson, Penn., has opened a new garage.

The Fall Creek Motor Company, Fall Creek, Wis., has just completed a new two-story garage which the company will occupy shortly. The new building contains showrooms, repair shop and vulcanizing department.

William C. Merz, Kewaskum, Wis., has purchased the Altenhofen garage at Random Lake, together with the agencies for the Ford and Case cars.

The Boyd Tire & Supply Company, Toledo, O., has opened a salesroom for the purpose of selling tires and accessories. The company is located at Jefferson avenue.

C. J. Schmidt & Company, Reading, Penn., has opened its new garage at 336-38 Madison avenue. The building has accommodation for 50 cars and every owner has a locker.

WITH THE MANUFACTURERS

The General Vehicle Company, Long Island City, N. Y., has erected a six-story concrete and steel building, which will be used expressly for the construction of electric vehicles and bodies. Building No. 5, shown herewith, will allow for an enlargement as soon as the company deems it advisable, and is for the G. V. Mercedes truck department of the company.

The Commerce Motor Car Company, Detroit, had a narrow escape from fire as the result of an explosion, which made a total wreck of the adjoining plant of the Mexican Crude Rubber Company. While the explosion was terrific, demolishing the heavy machinery and killing 10 men, with scores of wounded, the only damage suffered by the Commerce factory was the loss of thousands of small window panes. Several of the men at work assembling the delivery cars were blown over in a shower of glass. George B. Wilcox, the sales manager, reports production is unhampered.

The Jones Electric Starter Company, Chicago, Ill., manufacturer of the Jesco line of electric starting, lighting and ignition apparatus, has established a Detroit office at 1211 Woodward avenue. This branch will be in charge of E. L. Jones, E. E. He is vice president and chief engineer of the company.

The O'Mullins Quick Adjustable Wrench Company, Trenton, N. J., will manufacture a wrench which can be quickly adjusted and which stays adjusted until changed.

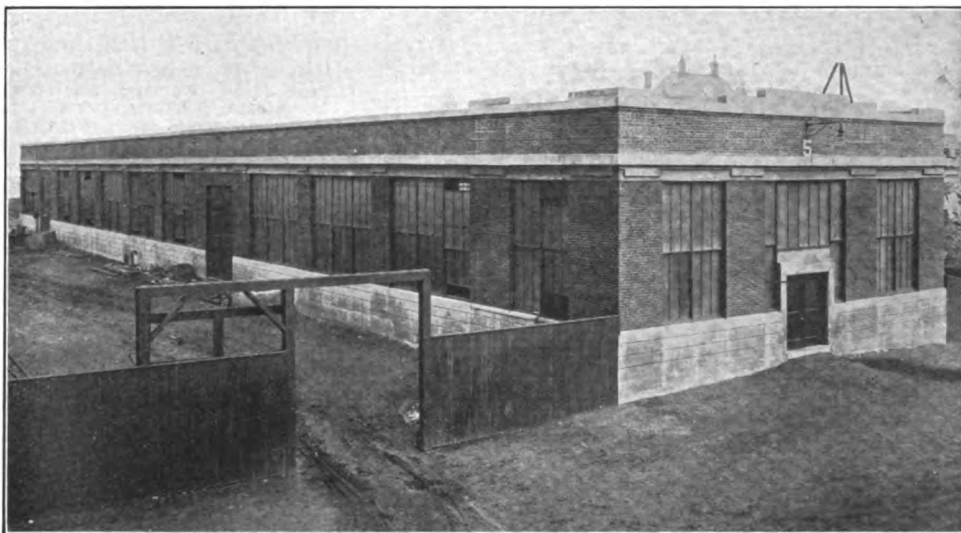
The Gadabout Motor Corporation of New York, Newark, N. J., has leased the factory building at the corner of Badger avenue. The company manufactures two-passenger cyclecars.

The Haynes Automobile Company, pioneer automobile builder of Kokomo, Ind., reports, through its general manager, A. G. Sieberling, that the month of May was a record-breaking month with that company.

The Moon Motor Car Company, St. Louis, Mo., has established agencies in Canada, South America and New Zealand.

The General Motors Truck Company, Pontiac, Mich., has just closed an order with the Indian Refining Company for seven two-ton gasoline trucks. This makes a total of 12 GMC trucks which the Indian Refining Company has purchased within the past month.

The Dayton Rubber Manufacturing Company, Dayton, O., manufacturer of Dayton airless tires and Dayton pneumatic tires, has moved its New York City office from



Building No. 5, Which Has Been Built for the G. V. Mercedes Truck Department of the Company and Which Will Be Enlarged Later.

1874 Broadway to 1851 Broadway, and now has one of the most attractive and up-to-date tire offices in that city.

The Champion Spark Plug Company, Toledo, O., announces that it is now turning out an average of 26,000 spark plugs a day. Four years ago the business was started in a small factory space in that city, the first daily production being about 400 plugs. The Champion plug is used in the factory equipment of Ford, Overland, Maxwell, Studebaker, Metz and many other cars.

The Swinchart Tire & Rubber Company, Akron, O., makes a variety of tires for truck use. A special cellular tire for electric trucks is stated to be extremely economical of current consumption, as the flow or "bunching" of the rubber is absorbed by the cells. Additional claims are that this tire transmits absolute traction; that it will not skid on wet or slippery pavements, and that the additional resiliency prolongs the life of both batteries and mechanism.

The National Rubber Filler Company, Midlothian, Tex., manufactures a rubber tire filler designed to take the place of the inner tube and air, which, the company states, ends all tire trouble. The company claims that it is made on the correct principle and out of the proper material to give service and satisfaction, high grade rubber cut in small pieces and vulcanized together being the medium employed.

RECENT PATENTS.

Rotary Valve, Henry Hopkes, Detroit, Mich.; assignor of one-half to Robert Hartenstein and one-half to Arthur F. Saenger; No. 1,098,574. Filed March 2, 1912.

Truck Brake, Russell Huff, Detroit, Mich.; assignor, by mesne assignments, to Packard Motor Car Company; No. 1,098,576. Filed May 7, 1908.

Resilient Wheel, Samuel Johnston, Sacramento, Cal.; assignor of three-eighths to Joseph D. Cornell and two-eighths to Sim Canman; No. 1,098,577. Filed July 17, 1912.

Tire Armor, Alvah L. Powell, Stockton, Cal.; assignor of one-fiftieth to Henry E. Wolfe; No. 1,098,588. Filed May 17, 1913.

Vehicle Spring, Marquis J. Todd, Buffalo, N. Y.; assignor to Buffalo Pitts Company; No. 1,098,598. Filed April 25, 1913.

Intake Manifold, Morton E. Hidden, East Orange, N. J.; assignor to Willis H. Simpson; No. 1,098,626. Filed June 13, 1913.

Spark Plug, Elmer C. Rauch, Coeur d'Alene, Idaho; No. 1,098,637. Filed Sept. 11, 1912.

Vehicle Jack, Brayton C. Richards, Chicago, Ill.; assignor to Henry S. Wilkel; No. 1,098,639. Filed Oct. 10, 1912.

Lathe Attachment for Crankshafts, Clinton E. Wilder, Erie, Penn.; No. 1,098,654. Filed Feb. 13, 1913.

Tire Pump, Charles P. McDowell and Richard H. East-er, Porter, Wash.; No. 1,098,674. Filed Sept. 19, 1912.

Pneumatic Tire Wheel, Julius Miskey, Dayton, O.; No. 1,098,677. Filed Oct. 4, 1913.

Motor, Paul H. Mueller and Ludwig H. Schuller, Brooklyn, N. Y.; assignors by direct and mesne assignments to L-M-S Motor Company; No. 1,098,679. Filed July 8, 1912.

Spark Plug, Adolph G. Bergstrom and Arthur Bergstrom, Rockford, Ill.; No. 1,098,705. Filed Dec. 30, 1912.

Resilient Wheel, William R. L. Ray, Fort Jones, Cal.; assignor of one-half to Maurice M. Zelle; No. 1,098,759. Filed May 31, 1912.

Motor Starter, Hans R. Setz, St. Louis, Mo.; assignor to Fulton Iron Works; No. 1,098,767. Filed March 24, 1913.

Resilient Wheel, Sanders Craig, Eagle Station, Ky.; No. 1,098,782. Filed Dec. 6, 1913.

Lubricating System, Paul Daimler, Cannstatt, Germany; assignor to the firm of Daimler-Motoren-Gesellschaft; No. 1,098,784. Filed Nov. 17, 1913.

Nut Lock, Jacob Farrell, Barronvale, Penn.; No. 1,098,790. Filed Aug. 13, 1913.

Motor, Charles Francis Jenkins, Washington, D. C.; No. 1,098,806. Filed July 3, 1911.

Axle Construction, John A. Marsh and Roy Ulrich, Jacksonville, Ore.; No. 1,098,816. Filed March 20, 1913.

Motor, Edward Moore, Syracuse, N. Y.; No. 1,098,824. Filed Sept. 8, 1908.

Shock Absorber, Francis X. Mudd, Chicago, Ill.; No. 1,098,826. Filed Oct. 23, 1913.

Carburetor, Clyde S. Munroe, River Forest, Ill.; No. 1,098,827. Filed Sept. 6, 1913.

Steering Knuckle, John Elmar Nelson, Hettinger, N. D.; No. 1,098,830. Filed May 10, 1913.

Bumper, Charles Welland, New York City; No. 1,098,860. Filed Feb. 14, 1914.

Starting Crank, Preston H. Breed, Pittsfield, Mass.; assignor, by mesne assignments, to Alden Sampson Manufacturing Company; No. 1,098,878. Filed March 2, 1910.

Intake Manifold, Howard S. Mountford, Algona, Ia.; No. 1,098,915. Filed Dec. 28, 1912.

Valve, Joseph Obermire and Daniel Krous, Catalpa, Neb.; No. 1,098,963. Filed Nov. 29, 1913.

Gasoline Gauge Structure, Frederick L. Pfahl, Akron, O.; No. 1,098,968. Filed May 26, 1913.

Nut Lock, John B. Young, Los Angeles, Cal.; No. 1,099,005. Filed March 7, 1913.

Ambulance Automobile, Frank E. Campbell, New York City; No. 1,099,020. Filed April 3, 1913.

License Holder, Louis Gottschall, New York City; No. 1,099,035. Filed April 17, 1913.

Motor, Charles M. Leech, Lima, O.; No. 1,099,065. Filed Oct. 8, 1912.

Shock Absorber, James Moir, Burlington, Ia.; No. 1,099,073. Filed July 20, 1913.

Carburetor, Thomas S. Hamilton, Tampa, Fla.; assignor to the Purified Petroleum Products Company. No. 1,099,086. Filed April 6, 1912.

Vulcanizer, Joseph Scott Benson, Riverside, Ia.; as-

signor to the Positive Supply Company; No. 1,099,112. Filed Nov. 19, 1912.

Electric Lamp, Ellsworth A. Hawthorne, Bridgeport, Conn.; No. 1,099,087. Filed Aug. 2, 1913.

Motor, Edwin L. Russell, Cleveland, O.; No. 1,099,102. Filed Aug. 21, 1911.

Motor Starter, Edgar F. Fruehbeck, Marfa, Tex.; No. 1,099,123. Filed Aug. 14, 1913.

Wheel, Robert Thomas Smith, Jr., Warrington, England; No. 1,099,133. Filed Dec. 27, 1913.

Demountable Wheel, Thomas I. Duffy, Chicago, Ill.; assignor to Henry Ellsworth and Albert E. Cross; No. 1,099,169. Filed Jan. 16, 1911.

Demountable Rim, Charles S. Goodfellow, Jersey City, N. J.; assignor to Albert Higson and Gustav H. Martens; No. 1,099,173. Filed Feb. 8, 1912.

Headlight, Oscar L. Vance, Decatur, Ind.; No. 1,099,217. Filed Oct. 29, 1913.

Folding Corner Seat, Harold H. Kennedy and Thomas J. Gibbons, Indianapolis, Ind.; assignors to the Waverley Company; No. 1,099,253. Filed Aug. 16, 1912.

Motor, Charles Sykora, Storden, Minn.; No. 1,099,271. Filed April 10, 1913.

Soft Tread Tire, Jacob W. Crusius, Paulding, O.; No. 1,099,282. Filed May 24, 1912.

COMING EVENTS.

June.

June 23-26—S. A. E. midsummer meeting, Cape May, N. J.
June 24-26—Meeting National Gas Engine Association, Chicago, Ill.

June 25—Track meet, Portland, Ore.

June 27—Race meet, Brooklands track, Weybridge, England.

June 27-July 4—American Automobile Association's touring week.

June 30—Track races, Sioux City, Ia.

June 30—Fourth International Rubber and Allied Industries Congress, London, England.

July.

July 1-3—Non-stop run, Chicago-Boston, for Glidden trophy.

July 2—Targa-Florio cup road race, Mandonic circuit, Italy.

July 3-4—Mid-summer meeting, American Automobile Association, Bretton Woods, N. H.

July 3-4—Road races, Tacoma, Wash.

July 3-4—Track race meet, Taylor, Tex.

July 4—Track race meet, Cedar Rapids, Ia.

July 4—Track races, Providence, R. I.

July 4—300-mile race, Sioux City, Ia.

July 4—Grand Prix, Lyons, France.

July 10—Track race meet, Rockdale, Tex.

July 17-18—Speedway meet, Seattle, Wash.

July 25-26—Grand Prix, Belgium.

August.

Aug. 16—International Light Car Race, Le Mans, France.

Aug. 21-22—Road races, Elgin, Ill.

Aug. 23—Coupe de l'Auto Race, Auvergne, France.

Aug. 27—Race meet, Brooklands track, Weybridge, England.

September.

Sept. 5—Track races, Milwaukee, Wis.

Sept. 7—Track races, Providence, R. I.

Sept. 9—Speedway races, Pomona, Cal.

Sept. 9—Road races, Corona, Cal.

Sept. 9—Grand Prix, Italy.

Sept. 14—Track meet, Milwaukee, Wis.

Sept. 26—Race meet, Brooklands track, Weybridge, England.

Sept. 26-Oct. 6—Show, Berlin, Germany.

October.

Oct. 1—Kerosene motor competition, Paris, France.

Oct. 2-3—Track meet, Oklahoma City, Okla.

Oct. 2-3—Track meet, Trenton, N. J.

Oct. 9—Speedway races, Chicago, Ill.

Oct. 9-Nov. 2—European trip, Society of Automobile Engineers.

Oct. 16-26—Automobile Salon, Paris.

Oct. 17-24—Show, Pittsburgh, Penn.

Oct. 19-26—American road congress, Atlanta, Ga.

November.

Nov. 6-16—Olympia show, London.

Nov. 8-11—Track meet, Shreveport, La.

AUTOMOBILE INSURANCE COMPANY.**Dealers, as Agents for Motor Underwriters, Can Insure Against Theft, Damage or Liability.**

Insurance has now been added as a department of the automobile industry. It is, or soon will be, possible for the man who buys a car to buy insurance of the dealer and to secure any adjustment as to repair through the manufacturer or dealer without going outside of the automobile industry.

This has been made possible through the Manufacturers' & Dealers' Motor Underwriters, Inc., New York City, which has entered the field with fire, theft, liability, property damage and collision insurance.

The officers of the new concern are: President, William E. Metzger; vice president, Ernest H. Greenwood; treasurer, Ballard McCall; manager of the metropolitan department, H. A. Bonnell.

The directors are: A. G. Batchelder, chairman of the executive committee of the American Automobile Association; Hugh Chalmers, president of the Chalmers Motor Car Company; Roy D. Chapin, president of the Hudson Motor Car Company; W. J. Foss, treasurer of the Foss-Hughes Company, Philadelphia; Ernest H. Greenwood; William B. Joyce, president of the National Surety Company; William M. Metzger, director of the National Automobile Chamber of Commerce; S. A. Miles, formerly general manager of the National Automobile Chamber of Commerce; H. H. Rice, vice president and general manager of the Waverley Company, and John N. Willys, president of the Willys-Overland Company.

The company plans to bring the maker, dealer and owner closely together, and its policy is unusual in that the owner who meets with an accident far from home need not be put to any delay in having his car repaired; he may go to the nearest dealer in the car he is driving, have the necessary repairs made, and the dealer and insurance company will attend to the matter in its further detail.

EXPERTS ADDRESS TRUCK CLUB.**Men Prominent in Motor Vehicle Field Give Interesting Addresses to Large Gathering.**

The Motor Truck Club of America held its monthly meeting June 17 at the Automobile Club of America. The speakers were: Fire Commis-

sioner Adams, F. E. Sampson, connected with the Exide Battery Company and formerly with the Fifth Avenue Coach Company; A. F. Masury, in charge of the service station of the International Motors Company; A. J. Slade, a consulting engineer, and G. A. Green, chief engineer of the Fifth Avenue Coach Company. A number of men prominent in the truck field also gave a general discussion on the subject. The papers of each of the speakers were illustrated by lantern slides.

ANOTHER FORD BOOST.**Detroit Man Inaugurates Novel Ideal of Showing Important Events in Big Automobile Centre.**

Henry Ford, of the Ford Motor Company, Detroit, has appointed A. B. Jewett to take charge of the moving picture department which has been recently installed in the Ford park plant and which will keep a number of men busy. Besides showing the most important events of the week in the city, the movies will depict interesting facts about the Ford plant.

It is reported that 50 picture houses have contracted for the Ford moving pictures, which are to be shown all over the state, also in Illinois, Indiana, Ohio and as far as the Coast. The pictures and films will be known as the Ford-Detroit Weekly.

FATALITIES DECREASE.**In Majority of Accidents Children Disregard All Laws of the Streets.**

Fatalities due to automobiles and motor trucks have decreased in New York City, according to statistics compiled by the National Highways Protective Society. During May 45 persons were killed in the streets. Of these, 21 were struck by wagons, 19 by motor propelled vehicles and five by trolley cars. The greater percentage of those killed were children. Secretary Edward S. Cornell states that car drivers are paying better attention to traffic rules than are drivers of horse drawn vehicles.

Touring Equipment is a subject in which all motorists are interested. The selection of practical accessories, etc., involves careful consideration. The Eighth Annual Touring Number of The Automobile Journal, to be published July 10, will contain suggestions for equipping the car.

CONTEST BOARD ANNOUNCES 1914 RULES.

THE contest board of the American Automobile Association has issued a synopsis of the 1914 contest rules explaining the changes that have been made. A more simple method of registration of stock models for touring contests has been provided, and the rules governing speed competitions of stock cars and stock chassis have been eliminated.

The class B classification has been eliminated and a new sub-division made in the class A price classification. Whereas formerly division 1A was for cars under \$800, there are now two divisions, 1A for \$450 and under and 2A for \$451 to \$800.

In a similar manner three new classifications have been added to the class C piston displacement classification. Whereas formerly the smallest division was for cars under 161 cubic inches, the new classifications are:

Cyclecar.....	Division 1C under 71 cubic inches.
Light car.....	Division 2C 71 to 100 cubic inches.
Small car.....	Division 3C 101 to 125 cubic inches.
	Division 4C 126 to 160 cubic inches.

The other divisions under classes A and C remain the same. There is no change in the sanction fees except whereas heretofore events 100 miles and over on specially constructed speedways have carried a fee of \$1000, the following modifications have been made:

Brick, Concrete, Wood, Etc.	
100 miles and under a day.....	\$250
101 miles and over.....	1000
Dirt and Other Materials.	
100 miles and under a day.....	\$250
101 miles and over.....	750
Dirt Only.	
100 miles and under a day.....	\$250
101 miles and over.....	500

Where programmes are composed entirely of events for cars under 125 cubic inches piston displacement, or \$450 in price, the sanction fees are 50 per cent. of those regularly prescribed. When such events constitute only a portion of the day's programme, the full fees will prevail.

In races of 100 miles or over the crew of a car must consist of a driver and a mechanic, and all mechanics must be registered.

A new rule is that governing the use of intoxicants in contests, the penalty being disqualification. There is no distinction between touring contests of six days and those over that period, as new grades for interclub and economy contests are included. A synopsis of the rules follows:

Grade one covers technical contests embrac-

ing preliminary and final examinations, tests of motor, clutch, gearset and brakes, with penalties for damaged or inoperative parts, lateness at controls and repairs and replacements.

Grade two imposes penalties only for lateness and work done.

Grade three imposes penalties for lateness in arrival at controls only.

Grades one and two may be conducted for stock or non-stock cars, but grade three is open only to non-stock cars.

Sanction fees for grade two contests have been reduced to \$30, and for grade three contests to \$10.

Stock car touring events may be conducted under price classification or piston displacement classification.

Touring cars and runabouts may compete together for the same prizes without reference to passenger carrying capacity.

There is no penalty for tire repairs and replacements, and the time consumed is added to the daily running time. Extra casings and tubes may be removed from competing cars in controls for repairs. Motors may be stopped during tire repairs without penalty. Demountable rims or wheels may be used in stock car events only where cars are regularly equipped.

The time lost on account of traffic delays occasioned by railroad crossings, congestion in city streets, open bridges, obstructed roadways, etc., will not be added to the daily running schedule, but such lost time must be made up.

An average speed of 14 miles an hour has been set for cars priced at \$450 and under, the former schedules of 16, 18 and 20 miles an hour remaining applicable to cars of \$451 to \$800, \$801 to \$1600 and over \$1600, respectively.

All cars are required to carry at least one passenger other than the driver, without regard to body equipment or carrying capacity.

Dry cells for ignition or lighting may be replaced without penalty, the work to be done in the car's running time.

Replacing or recharging of storage batteries where charging generator is regular equipment will be penalized.

Replacing or recharging of storage batteries where no charging means are furnished will be allowed without penalty.

The fixed penalty schedule has been amplified to provide penalties for damaged or inoperative equipment.



"STOP AT HOTEL LENOX"

Motorists who visit this hotel once, invariably tell their friends that—for *Fair Rates*, complete and perfect equipment and unfailing courtesy

BUFFALO'S LEADING TOURIST HOTEL

unquestionably excels. Beautifully located in exclusive section—North St. at Delaware Ave. Thoroughly modern—fireproof. Best obtainable cuisine—quiet, efficient service.

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\$1.50 per day and up

HOTEL LENOX, C. A. MINER,
Manager



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The Brake Lining of Quality
BRINGS
Sales to the Dealer
Safety to the Owner
Service all Around

Adopted after test as regular equipment on Quality Cars. Woven of the purest of asbestos and treated by an exclusive formula. Multibestos has the highest co-efficient of friction and wears most uniformly through the longest life.

Standard Woven Fabric Co., Framingham, Mass.

SALES BRANCHES:

New York, 276 Canal St. Chicago, 1430 Michigan Blvd.
Philadelphia, 1427 Vine St. Boston, 908 Boylston St.
San Francisco, Fred Ward & Son, Inc.



PISTON HEAD PACKING RINGS

McQUAY-NORRIS MFG. CO., - - Dep't D, ST. LOUIS, MO.

There's no leak proof ring but the **LEAK PROOF** Ring—insist

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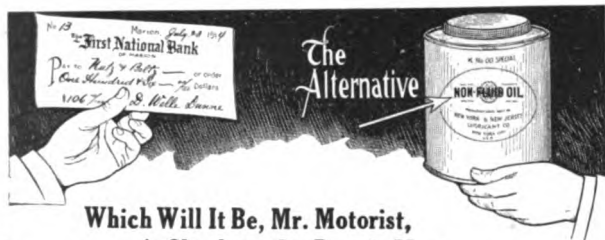
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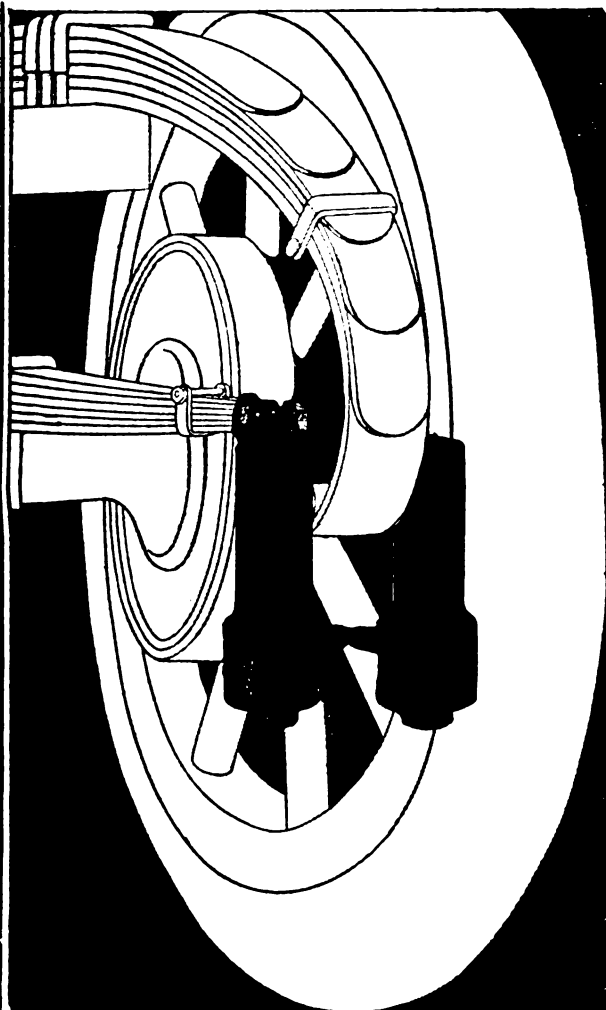
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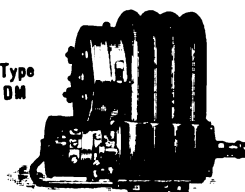
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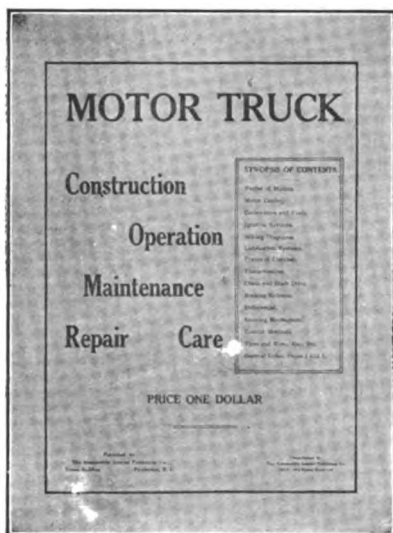
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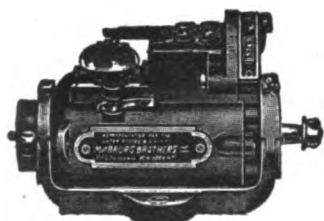


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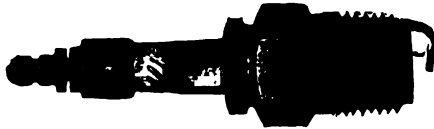
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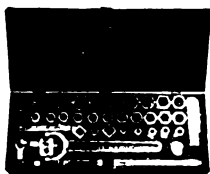
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Branches: See Cars—Gasoline Commercial.
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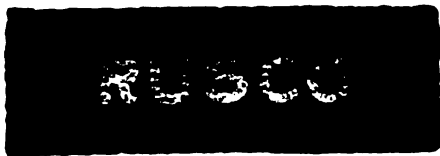
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Dover Stamping & Manufacturing Co., Cambridge, Mass. (Auto and Savol.)

METERS, ETC.

Kent Mfg. Works, Atwater, 4937 Stenton Ave., Wayne Junction, Philadelphia. (Kent Pocket.)
Northwestern Chemical Co., Marietta, O. (Hydrometers and Thermometers.)

MOTOR STARTERS.

Automatic Appliance Co., 172 Columbus Ave., Boston. (Boston.)
Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.

PAINT, ANTI-RUST.

Northwestern Chemical Co., Marietta, O. (Never-Rust.)

PATCHES, TIRE.

Braender Rubber & Tire Co., Rutherford, N. J. (Cementless.)

PISTON RINGS.

McQuay-Norris Mfg. Co., Dept. D, St. Louis, Mo. (Leak-Proof.)

POLISH.

International Metal Polish Co., Quill St. and Belt R. R., Indianapolis, Ind. (Blue Ribbon.)
Morgan Mfg. Co., Dept. F, Newport, R. I. (MorganBrite.)
Northwestern Chemical Co., Marietta, O.
Rub-On Mfg. Co., 87-97 Brayton St., Buffalo, N. Y.

PUBLICATIONS, AUTOMOBILE.

The Automobile Journal, 24 issues, \$1.00 the year.
The Motor Truck (Commercial Car), Monthly, \$2.00 the year.
The Accessory and Garage Journal, Monthly, \$2.00 the year.
Motor Truck Construction, Operation, Care and Repair\$1.00
The A B C of Aerial Navigation\$1.00
The A B C of Motor Car Operation50
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Lighting the Motor Car by Electricity50
The A B C of Internal Combustion Engine Maintenance and Repair35
The A B C of Carburetor Construction, Maintenance and Repair35
The A B C of Magneto Systems35
The A B C of Battery Ignition Systems35
The Motorcycle, Maintenance, Repair and Construction35
The A B C of Motor Car Chassis Maintenance and Repair25

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Contains the names of all active concerns in all branches of the Automobile Industry.

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We can cut your trade mailing list expense in half and give a service that cannot be equalled.

Accessory and Garage Journal
Times Building Pawtucket, R. I.

"PASS THEM ALL"



KNOX
BEST BY TEST
MOTOR CARS

Send for Pleasure or Commercial Catalogue.
KNOX MOTORS CO., SPRINGFIELD, MASS.



Cartercar
SMOOTH—QUIET—POWERFUL
Model 7, \$1250
Other Models \$1600, \$1700, \$1900, \$2000
Write for full particulars and catalogue
Cartercar Company Pontiac Michigan

LEXINGTON || **HOWARD**
"FOUR" \$1335 "SIX" \$2375

It's the men behind them that make them leaders of their class,
Send for descriptive catalogs.

THE LEXINGTON-HOWARD COMPANY
131 Main Street, Connersville, Ind., U. S. A.

F. SHIRLEY BOYD
903 Boylston St. Boston, Mass.

Dorian Demountable Rims.
J. H. S. Shock Absorber. R. I. V. Ball Bearings.

ASK FOR COLUMB TREAD NON-SKID
PROWODNIK Russian Tires
Made for Russian Roads
BEST ON ALL ROADS
COLUMB TYRES IMPORT CO., Inc., 1891 B'w'y, N.Y.

MAXWELL MOTOR COMPANY (Inc.)
DETROIT, U. S. A.

(BUYERS' GUIDE—Continued.)

Maintenance and Repair of Motor Car Tires..... .25
Sent Postpaid to any address in United States upon receipt of price. Address all communications to The Automobile Journal, Times Building, Pawtucket, R. I.

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Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.

PUMPS, TIRE.

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.
Shawver Co., Springfield, O.

RIMS—REMOVABLE AND DETACHABLE.

Boyd, F. Shirley, 903 Boylston St., Boston. (Dorian.)
Chester Demountable Rim Co., Fall River, Mass. (Chester Demountable.)
United States Tire Co., Broadway and 58th St., New York. (Continental and Whittlesey Demountable.)
Branches: New York, Chicago, San Francisco.

RINGS. (See Piston Rings.)**ROAD BUILDING MATERIALS.**

Barrett Manufacturing Co., New York. (Tarvia.)
Branches: Chicago, Philadelphia, Boston, St. Louis, Cleveland, Pittsburg, Cincinnati, Kansas City, Minneapolis, New Orleans, Birmingham, Ala.; Seattle, London, Eng.; Montreal, Toronto, Winnipeg, Vancouver, Can.; St. John, N. B.; Halifax, N. S.

ROLLER BEARINGS.

Norma Co. of America, 1790 Broadway, New York City. (Norma.)

SEAT COVERS.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

SELF-STARTERS. (See Motor Starters.)**SHOCK ABSORBERS AND SUPPLEMENTARY SPRINGS.**

Boyd, F. Shirley, 903 Boylston St., Boston.
J. M. Shock Absorber Co., 210 So. 17th St., Philadelphia. (J. M.)
Perkins-Campbell Co., 622 Broadway, Cincinnati, O.
Sager Co., J. H., 271 South Ave., Rochester, N. Y. (Peerless.)

SOAPS.

Colgate & Co., 199 Fulton St., New York City. (Moto-Gloss and Mechanics' Soap Paste.)
Northwestern Chemical Co., Marietta, O. (Dermalene.)

SPARK PLUG CASES.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

SPARK PLUGS AND IGNITERS.

Alsten & Goulding Co., 36 Foster St., Worcester, Mass. (Alding.)
Bosch Magneto Co., 223-225 W. 46th St., New York.
Branches: See Magnetos and Magneto Supplies.
Heinze Electric Co., Lowell, Mass. (H. E. Co. Priming.)
Mosler, A. R., & Co., P. O. Box M, Mt. Vernon, N. Y. (Spit-Fire.)
Slivex Company, The, 60 Wall St., New York City. (Bethlehem Five Point.)
Splitdorf Electrical Co., 98 Warren St., Newark, N. J.
Branches: See Magnetos and Magneto Supplies.

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(BUYERS' GUIDE—Continued.)**SPEEDOMETERS, RECORDERS, ETC.**

Northwestern Chemical Co., Marietta, O. (Hydrometers and Thermometers.)

SPRINGS FOR AUTOMOBILE SUSPENSION.

Marburg Bros., Inc., 1790 Broadway, New York. (Marburg-Hagen.)

SPROCKETS.

Boyd, F. Shirley, 903 Boylston St., Boston. (Baldwin.)

STEEL, ETC.

Ward's Sons, E. T., 25 Purchase St., Boston, Mass. (Seamless.)

TAIL LIGHT DETECTORS.

Harding Specialties Co., Inc., 755 Boylston St., Boston. (Boston.)

TAIL LIGHTS.

Combination Tail Light Co., 954 Tremont St., Boston. (Universal Electric.)

TANKS, ACETYLENE GAS.

Prest-O-Lite Company, 226 Speedway, Indianapolis. (Prest-O-Lite.)

Branches: See Cylinder Cleaning Compound.

TANKS, TIRE INFLATING.

Prest-O-Lite Company, 226 Speedway, Indianapolis. (Baby Tire Filler, The Emancipator.)

Branches: See Cylinder Cleaning Compound.

THERMOS CASES.

Dover Stamping & Mfg. Co., Cambridge, Mass.

TIRE ACCESSORIES.

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y. (Holders.)

Shawver Co., Springfield, O. (Tools.)

Stevens Mfg. & Supply Co., Fisher Bldg., Chicago. (Stevens Valves.)

TIRE CHAIN GRIPS. (See Chains.)**TIRE PRESERVATIVES AND PROTECTORS.**

Northwestern Chemical Co., Marietta, O. (Tire-Lac.)

TIRES—CASINGS AND INNER TUBES.

Braender Rubber & Tire Co., Rutherford, N. J. (Braender.)

Goodyear Tire & Rubber Co., Madison St., Akron, O. (No-Rim-Cut.)

Branches: In all principal cities.

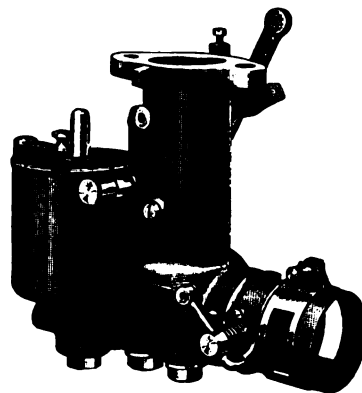
Lax-Fal Rubber Co., Dept. S, 77 Chambers St., New York

(Continued on Next Page.)

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made the greatest step forward in carburetion since Krebs' early device when the Zenith was invented. And like practically all great inventions it was achieved by an amateur who started with an unbiased mind and applied common sense to the fundamentals of carburetion. Baverey's principle of "the compound nozzle" has made history.

**The Endorsement of Europe**

Today 125,000 Zenith carburetors are being used in high grade foreign cars alone. Factories in France, Germany and England are supplying over 150 concerns—names known around the world as Europe's best. At the recent London Show 41.5% of all cars exhibited were Zenith equipped. At Paris 46%—nearly half of all—carried this device of high efficiency. Europe's sanction comes slow—but means much.

The Carburetor with Trouble Left Out

The Zenith contains no moving parts, no valves, no springs. Once properly set, it has no wear and cannot be altered by the novice. It outlasts the car. Already eight well known American cars have chosen the Zenith above all as their standard equipment. Many more will follow as they test this famous device which for speed, for economy, for great flexibility is supreme. Science has given it the compound nozzle. Why not write for details?



(BUYERS' GUIDE—Continued.)



WHY USE INFERIOR PLUG WHEN CENTERFIRE

can be bought at the same price? They overcome all Engine troubles, fire where others fail and Add Power to engine. Any length point desired made to order. Try them and you will use them—always. Make a trial and save money. \$1.00 each, 6 for \$5.00.

GUARANTEED

Agents wanted and special prices to dealers.

Milwaukee Auto Specialty Co.
705-707-709-711 Chestnut St., Milwaukee, Wis.

The Fastest Riding
Car in the
World

MARMON

F. E. WING
562 Commonwealth Ave.
BOSTON, MASS.

New England Dealer for

NORDYKE & MARMON CO., Indianapolis, Ind.

MARMON "48"
\$5000

MARMON "41"
\$3250

MARMON "32"
\$3000

New Departure Guaranteed Ball Bearings

American Made for American Trade

THE NEW DEPARTURE MFG. CO.

Bristol, Conn.

Western Branch, 1016-17 Ford Bldg., Detroit

COLGATE'S MECHANICS' SOAP PASTE

A hand cleanser, pleasantly perfumed. It removes grime and grease but is "kind to the skin." Sample sent for 2 cents.

COLGATE & CO., Dept. 22, 199 Fulton St., NEW YORK

\$485 Salvador Car \$485

Four-Cylinder, Water-Cooled Unit Power Plant with Three Speed Selective Transmission and Shaft Drive. The Quality and Equipment of the High-Priced Car at Cyclecar Price.

SALVADOR MOTOR CO., 126 Massachusetts Avenue
Boston, Mass.

COLE

THE STANDARDIZED CAR



The car that started the stampede to standardization
A Cole franchise is a valuable asset to any dealer. Find out about it.

Cole Motor Car Co. of Indianapolis

EVERYTHING FOR THE AUTOMOBILE

WAITE AUTO SUPPLY CO.

Manufacturers and Jobbers

81 Exchange Place

Providence, R. I.

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City. (Lax-Fal Guaranteed.)

Mots Tire & Rubber Co., Akron, O.

United States Tire Co., Broadway and 58th St., New York.
(Continental, G & J, Hartford, Morgan & Wright.)

Branches: See Rims—Removable and Detachable.

TIRES—SOLID AND COMMERCIAL.

Goodrich Co., B. F., Akron, O. (Goodrich.)

United States Tire Co., Broadway and 58th St., New York.

Branches: See Rims—Removable and Detachable.

TOPS AND ATTACHMENTS.

Springfield Metal Body Co., 20 Medford Ave., Springfield, Mass.

TRUCKS AND TRACTORS—(See Cars, Commercial.)

TRUNK RACKS.

Connecticut Steel & Wire Co., Hartford, Conn.

VALVE LIFTERS.

Paro, H. G., Suite 718-719, Michigan Blvd. Bldg., 30 No. Michigan Blvd., Chicago.

Winsor Manufacturing Co., Providence, R. I.

VARNISHES, ETC.

Rub-On Mfg. Co., 87-97 Brayton St., Buffalo, N. Y.

Valentine & Co., 456 Fourth Ave., New York City; 343 So. Dearborn St., Chicago; 74 Pearl St., Boston.

VENTILATORS.

Wattles, C. B., 441 Butler Exchange, Providence, R. I.
(Excelsior Adjustable.)

VIBRATORS. (See Master Vibrators.)

VOLTMETERS—(See Ammeters.)

VULCANIZERS.

National Motor Car Supply Co., 5604 Euclid Ave., Cleveland. (National Garage Steam and Wizard Automatic.)

Vanderpool Co., Springfield, O.

Williams Foundry & Machine Co., Akron, O.

WELDING OUTFITS.

Prest-O-Lite Company, 226 Speedway, Indianapolis.
(Prest-O-Welder.)

Branches: See Cylinder Cleaning Compound.

WHEELS, WIRE.

Houk Co., Geo. W., 1699 Elmwood Ave., Buffalo, N. Y.
(Houk Detachable.)

WRENCHES AND COMBINATION OUTFITS.

Coes Wrench Co., Worcester, Mass.

Cutter, George A., Taunton, Mass.

Monsberg Co., Frank, Attleboro, Mass.

EIGHTH ANNUAL TOURING NUMBER

—OF—



EDITION 30,000

Issued July 10, 1914

**A
Route
Guide and
Touring Book**

**350 PAGES OF
TOURING DATA**

Hundreds of Historical and Scenic Illustrations, and a Complete Series of Specially Drawn Touring Maps Covering All Parts of America.

The Greatest Feature Issue of Any Motoring Magazine Ever Published. Sold at the Regular Price, 10 Cents.

Retained and Referred to by Car Owners Constantly During the Year to Come, According Advertisers Effective and Lasting Publicity.

Last Advertising Form Closes July 7.

Automobile Journal Publishing Co.

Times Building

Pawtucket, R. I.



For Our "100 Million" Nation



Send an additional dollar and get a pair of Lincoln Highway pennants for your car. We also have some fine big wall maps in three colors, which show the route of the Highway, a great thing for your office, for two dollars

A growth of 7,000,000 in four years has placed the United States in a position where it "looms as the true colossus of the modern world".

In colossal achievements, it has surpassed the works of antiquity. The airy Gothic Spires of the Woolworth Building, the shining tip of the Tower, stand as eloquent attestations of this American progress.

It has remained for the United States to carry to successful termination, that gigantic project—the Panama Canal.

In constructive work of all kinds the American Nation has taken the lead, holding her Light of Liberty and Peace high above sordid jealousies and selfish desires, setting for the whole world a worthy and well meaning example of true Brotherhood and Co-operation. Justly we may be proud that we are Americans.

For another great thing is to be done—there is to be a true "Uniting of the Union." A great shining band of Brotherhood is to be stretched across the continent, from coast to

coast, state to state, city to city, linking the hearts of all true Americans still closer together.

The Lincoln Highway—continuous, connecting, improved — a road of beauty and comfort—*Your Way and My Way.*

A splendid national monument dedicated to the great citizen of the Republic, who stands as exponent of fine courage, lofty aspiration, and vigorous, masterful American genius. Lincoln could have no more appropriate — no more enduring—tribute.

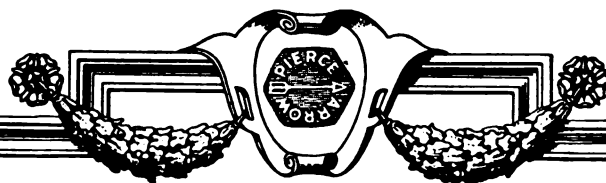
You can share—you can help, in the building of this glorious memorial.

Do it—send five dollars to—

THE LINCOLN HIGHWAY ASSOCIATION

Dime Bank Building

Detroit, Mich.



PIERCE-ARROW

*A car whose luxury is added
to its genuine economy*

WE are constantly hearing of Pierce-Arrow owners, to whom the price of a new car means little, who have continued to run their original cars through a long series of years—often seven or more—with such increasing satisfaction that all the real refinements in later models have not been able to tempt them away from the Pierce-Arrow which seemed to them the ideal motor car.

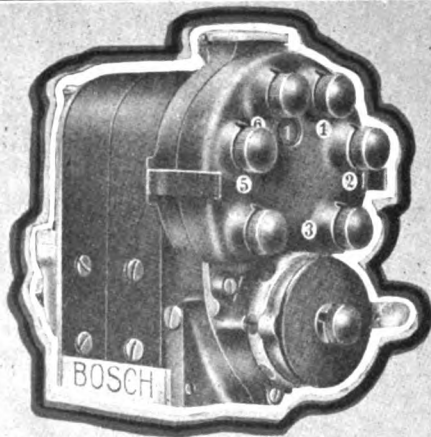
Such lasting satisfaction has demonstrated not only the durability of Pierce-Arrow Cars—it has demonstrated that they are also most economical. For in cases of this kind the initial cost is not a new item every year. It is paid down *once*, and its returns are then distributed over many years of service, over miles of travel. Even when the charges for proper care and maintenance are added, the total expense of the Pierce-Arrow year by year is still less than that of new cars of greatly lower initial cost for the same period.

Multiply this economical satisfaction by Pierce-Arrow safety, comfort and luxury and a just measure of Pierce-Arrow quality is obtained. It gives a new value to the original investment. It means that with adequate maintenance the endurance is there, the vitality is there, the built-in worth is there, not merely for a single season or even for two, but over a long series of years.

The buyer of a new Pierce-Arrow has the comfortable assurance that the market in Pierce-Arrows is always an active one. The man whose investment must be, for any reason, somewhat lower, always knows that in buying a Pierce-Arrow from its first owner he is securing the better materials and better construction which constitute its vitality, and which make it a wiser, more economical purchase than a new car at the same price.

Pierce-Arrow cars are built in three chassis sizes, 38, 48 and 66 horsepower. These chassis are equipped with many types of open and enclosed bodies, including a runabout with interchangeable Victoria and coupe top.

The Pierce-Arrow Motor Car Company
Buffalo, New York

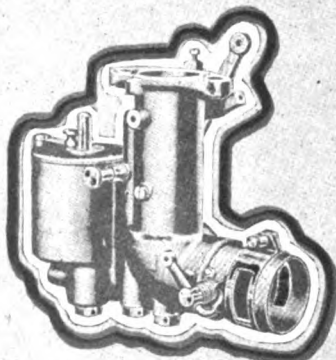


BOSCH
MAGNETOS-SPARK PLUGS

KEMCO
FAN-TYPE GENERATOR
LEAK-PROOF
PISTON RINGS



ZENITH
CARBURETORS
QUALITY **MOHAWK** TIRES



As Specialists in the field of Motor Accessories we chose for distribution only products of known quality and proven dependability.

We concentrate our efforts so that we can give expert advice, efficient service and lowest prices.

The result is a significant growth, proving our methods correct.

We invite requests from the Trade for an outline of our co-operative service, which has already brought success and increased sales to many.

MOTOR PARTS COMPANY

187 COLUMBUS AVE., BOSTON

PHILADELPHIA, SPRINGFIELD, BUFFALO

VOL. XXXVII

NO. 11

AUTOMOBILE JOURNAL

\$100 the year
10 Cents the Copy

PAWTUCKET, R.I.

EIGHTH ANNUAL TOURING NUMBER



On request we will mail a pamphlet on the Construction, Operation and Lubrication of Automobile Engines. It describes in detail the common engine troubles and gives their causes and remedies.



Mobiloils

The various grades of Gargoyle Mobiloils, purified to remove free carbon, are:

- Gargoyle Mobiloil "A"
- Gargoyle Mobiloil "B"
- Gargoyle Mobiloil "E"
- Gargoyle Mobiloil "Arette"

They can be secured from reliable garages, automobile supply houses, hardware stores and others who supply lubricants.

It is safest to buy in original barrels, half-barrels, and sealed five and one-gallon cans. See that the red Gargoyle, our mark of manufacture, is on the container.

VACUUM OIL COMPANY
Rochester, N. Y., U. S. A.

PUBLISHED
by the
AUTOMOBILE JOURNAL
PUBLISHING COMPANY

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MYRON WALDEN



Brake Lining

Guaranteed for one year's wear.

Mr. Car Owner:—

You have behind this guarantee the **ONLY COMPANY IN THE WORLD** who manufacture **BRAKES AND BRAKE LINING**. Our factory is open for your inspection at any time during working hours.

RAYBESTOS is the Recognized Standard Brake Lining. When having your brakes re-lined insist on the lining with the "SILVER-EDGE". It's your guarantee.

Whenever you see the name RAYBESTOS, you will know it represents the very utmost in safety, serviceability and strength.

Handled everywhere by all jobbers and dealers.

THE ROYAL EQUIPMENT CO.

1378 Bostwick Avenue

Bridgeport, Conn.

WINTON SIX Model 21—Now Ready

A New Beauty for 1915

With Distinctive Individuality for You Personally

THE rare beauty of this car challenges admiration. Best of all, we give *your personal* car a special individuality to meet your own good taste and to distinguish *your* car from every other owner's car. But that's a matter we prefer to take up with you personally.

All the sterling features of Winton construction are retained in Model 21. The enlarged radiator and bonnet blend into a pleasing unit with the new body, which is of singularly attractive design. The raised stream-line panel has been seen heretofore on limousines only. Doors are wider and swing on concealed hinges. No outside handles. Seats are roomier. The cowl board arrangement is new. A tonneau light is provided. Springs are always automatically oiled by Dann cushion inserts. Wheel base 136 inches (on four-passenger and runabout cars, 130 inches). Especial provision has been made for the most satisfying comfort.

Note the Equipment:

Electric starter, or Air starter. You may have your choice *without* extra charge.

Complete electric lighting system.

One-man top of finest mohair; has easily handled curtains.

New-design rain-vision glass front.

Klaxon electric horn, concealed under bonnet.

Waltham eight-day clock, with highest-grade watch movement.

First-grade Warner speedometer.

Improved tire carriers at rear.

Demountable rims.

Tires—37x5-inch, all around.

Power-driven tire pump.

Full set of tools.

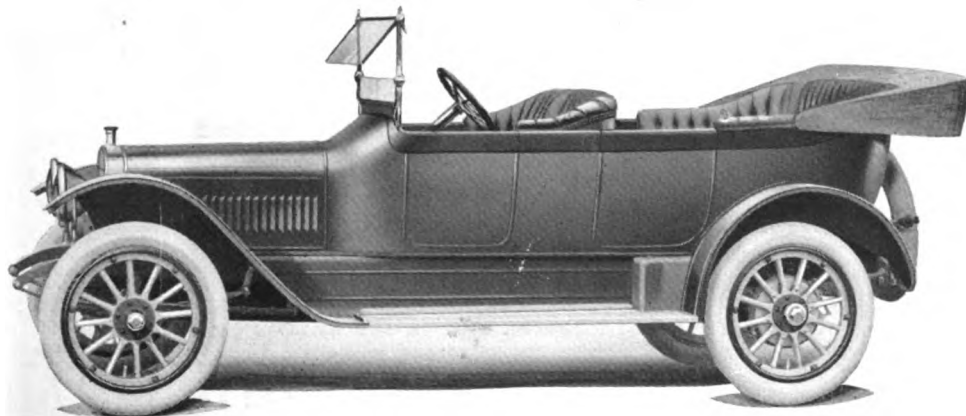
The price of the five-passenger car is \$3250 fully equipped, and—

You may write your own guarantee.

Write for 1915 catalog; now ready. Ask us about the exclusive feature of individuality for your own car.

The Winton Motor Car Company, 131 Berea Road, Cleveland, Ohio, U. S. A.

Direct Factory Branch Houses in 20 Leading Automobile Centers.



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VICTORIOUS METZ "22"

CLEAN SWEEP OF HILL CLIMB

FREE-FOR-ALL
1-2-3

WINS

CLASS A
1-2-3-4

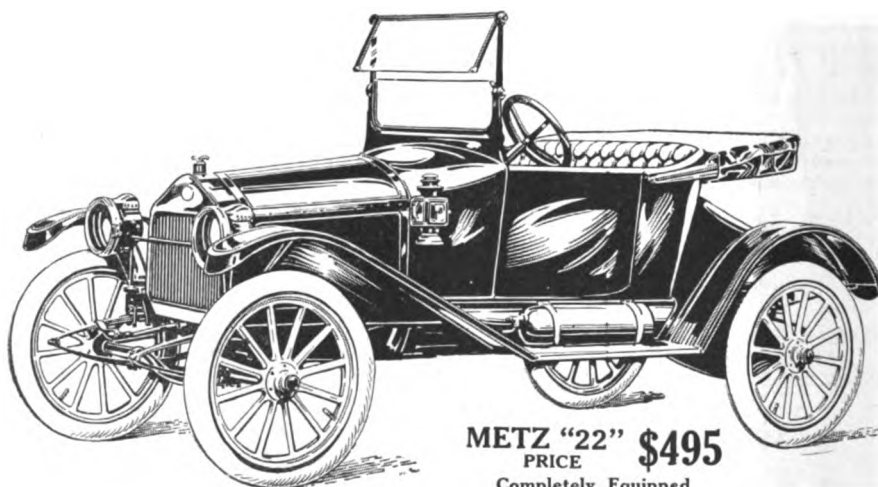
RICHFIELD SPRINGS, N. Y., July 4.

DEFEATING THE TIME OF EVERY OTHER CAR COMPETING IN SEVEN EVENTS
Record for the Hill, Length 7-8 Mile

1, Metz, Guiney.....0.55½	6, Mercer, Roberts.....1.03½	11, Chevrolet, Adams.....1.13¾
2, Metz, Metz.....0.56½	7, Pope-Hartford, Gorton 1.06½	12, Maxwell, Dalker.....1.14½
3, Metz, Roder.....0.57½	8, Chandler, Skinner.....1.09¼	13, Maxwell, Senf.....1.17¾
4, Mercer, Foster.....1.00½	9, Oakland "6", Henabray 1.00½	14, Paige-Detroit, Hitchcock 1.19
5, Chalmers, Skinner.....1.00¾	10, Overland, Francis.....1.10	15, Regal, Howard.....1.25¼

SENSATIONAL VICTORY FOR THE GEARLESS TRANSMISSION

Another Wonderful Demonstration of the Power and Capacity of the Cars That Won the 1913 GLIDDEN TOUR and the Uniontown, Pa., Hill Climb, June 18, 1914.



METZ "22" \$495
PRICE
Completely Equipped

METZ Owners Make 28 to 32 Miles to a Gallon of Fuel

METZ Owners Make 100 Miles to a Pint of Oil

METZ Owners Make 10,000 to 12,000 Miles on a Set of Tires

METZ Owners Make 50 Miles an Hour

DEALERS

METZ Representatives Are Wanted in Every Commercial Center. Our Agency Proposition Means Big Results. Write for Catalogue "Q."

METZ COMPANY, - WALTHAM, MASS.

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METZ "22"

EQUIPPED \$495 COMPLETE

Streamline Body

Fore Door Model

*Enduring, Luxurious, Economical
Powerful and Speedy on Country Roads
A Marvel to Control in City Traffic
Ideal in Every Service*

Four-Cylinder, Water-Cooled, Enbloc Motor of 22.5 Horsepower, Mechanical Feed, Constant-Level Lubricating System, High Tension Magneto Ignition and Automatic Float Feed Carburetor. Left Side Drive and Center Control.

GEARLESS Transmission, Affording Any Speed Ratio and Just the Precise Power Required, for the Smooth Boulevard to the Cart Path or the Steepest Grade.

The FORE DOOR Model Affords the Acme of Motoring Luxury. Big, Roomy Seats, Upholstered with Tufted Leather, Doors 20 Inches Width, Plate-Glass Rain-Vision Windshield, Prest-O-Lite Tank, Best Quality Goodrich Clincher Tires.

A Car That for Endurance Has Been Proven Against the Best Productions of the Industry. Perfect Scores Won the GLIDDEN TROPHY in 1913.

A Marvel of Simplicity and Accessibility, the Most Economical Car Ever Built, No Matter What the Type.

A Car Developed from 16 Years' Experience, Suited for Every Purpose, for Every Service.

METZ Design, METZ Construction, METZ Quality Are Not Experiments.

Catalogue "Q" Will Bring You Full Information. Write for It Today.

METZ COMPANY, - WALTHAM, MASS.

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An Eight Year's Endurance Run

One hundred and one Cartercars began service eight years ago, the first year that they were manufactured.

Today, after use and abuse for a period of more than twice the average life of a gear driven car, they are all in active use.

Many of these Cartercars have over 100,000 miles to their credit yet they are still economical cars for their owners in the matter of repairs.



The Cartercars that are being made today have many improvements added and are much more completely equipped with accessories and conveniences than were the first ones—

Yet the same principle, that of the gearless transmission, and the careful construction from the best materials are back of every Cartercar today just the same as in 1905.

The Cartercar that you buy today is the embodiment of long life, ease of control, powerful ability and economical operation.

If you will take a ride with us in a Cartercar you will see that we have not exaggerated our claims for it, and a few years behind the wheel of one will convince you that there is no better car manufactured at any price.

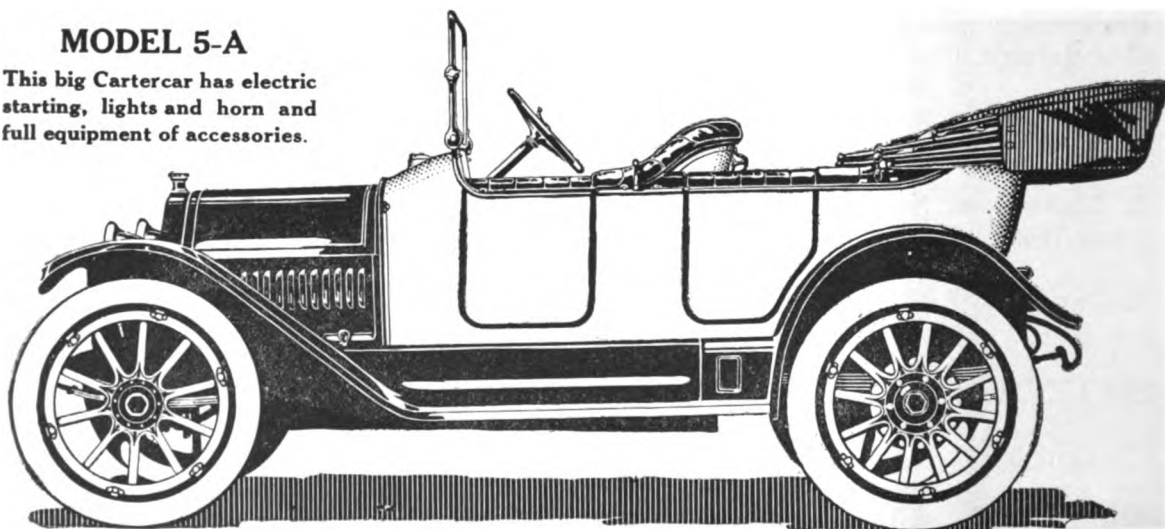
Come take a ride today. Just Phone the Nearest Cartercar Dealer and he will call for you.

Cartercar Company, Pontiac, Michigan

Branches at New York, Chicago, Detroit, Kansas City, Atlanta

MODEL 5-A

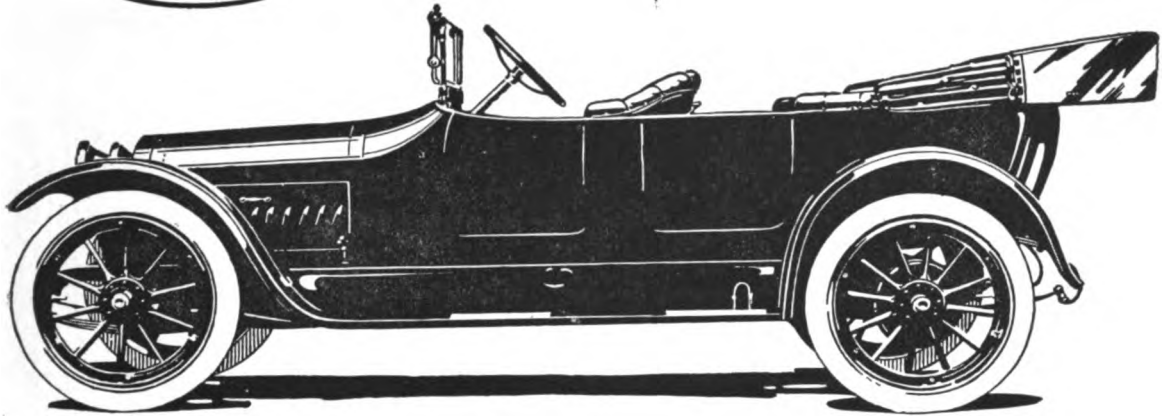
This big Cartercar has electric starting, lights and horn and full equipment of accessories.



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\$1085 INCLUDING ELECTRIC
STARTING & LIGHTING



The New Regal—A Thoroughbred at a Popular Price

An overhung car—a one-chassis car—a big-production car—backed by a \$3,000,000 company

It's a car that doesn't carry the price-mark on it—the lines are those of a \$6,000 car most admired at the last London exhibit.

A car that will really hold five people—not crowded and jammed together—but comfortably. Plenty of body room and foot room in both driver's seat and tonneau; 23-inch tonneau doors—rear seat 48 inches wide

A motor that will just skim over the hills—39 h. p. on actual brake test—and an electric starting device that is the simplest and most efficient yet produced.

The new Regal will be made in tens of thousands—our whole big 10-acre factory will be devoted to this one chassis, with roadster and touring bodies.

You can get prompt deliveries, so that you won't lose sales through no fault of your own—and your profit will be satisfactory.

We are buying advertising for the new Regal just as we buy material—so much advertising for every car; and the amount will run well into the hundreds of thousands of dollars.

It starts with a 2-page spread in the June 20th issue of the Saturday Evening Post, and will be followed by page advertisements

THE REGAL MOTOR CAR COMPANY, 130 Piquette Ave., Detroit, Mich.
Canadian Factory: Berlin, Ontario

(When Writing to Advertisers, Please Mention The Automobile Journal.)

regularly in the other big weeklies. Large space will also be used continuously in the farm papers, trade papers, and over a hundred newspapers—all at our expense.

Quick Action Necessary

We are strengthening our organization at every point. We are after good dealers in every locality. The new Regal is already being turned out in quantity, and reservations are pouring in on us. Our distributors and dealers who have tried out the new Regal are doubling and trebling their specifications.

Don't delay, but write or telegraph at once regarding territory, or come in to the factory.

WHAT THE REGAL BUYER GETS

Direct Electric Starter	Left Side Drive
Electric Lights, with "Dummer"	Center Control
Electric Horn	300 to 500 lbs. Less Weight
Simplified Electric Wiring	112-inch Wheel Base
Removable Motor Head	Unusual Foreign Design
Gasoline Saver Valves	23-inch Tonneau Doors
Extra Size Brakes—12 inches	48-inch Rear Seat
Hidden Radiator Cap	Adjustable Wind Shield
One-Man Top	Inside Curtains

SPECIFICATIONS: Motor, 4 cylinders, cast en bloc—34 x 5. Removable motor top, giving easy access to pistons and valves. Three point suspension. **Starting:** Electric, acting directly on fly-wheel; three sources of power—generator, storage battery and dry cells. **Drives:** Left side, with center control. All operating controls on dash. **Springs:** Front, semi-elliptic; rear, three-quarter elliptic. **Ignition:** Atwater-Kent Unispark, delivering single spark and automatically adjusting itself to engine speed. **Asides:** Front, I-beam; drop forged; rear, three-quarter floating. **Brakes:** Internal expanding, external contracting; 12-inch brake-drum. **Body:** Full stream-line—hidden radiator cap. **Wheelbase:** 112-inches. **Weights:** Under 2,400 pounds with all equipment. **Equipment:** One-man top; inside curtains; electric head-lights with dimmer attachment; electric tail-light; electric horn with button in center of steering wheel; 32 x 3½-inch tires; demountable rims with one extra rim; clear-vision windshield; tools and tire repair kit.



**Wrenches Are Made Right, Stay Right,
Last a Lifetime, and are 30% Stronger
Than Any Other.**

**"COES" on any Wrench Means Quality,
Best Material and Finest Workmanship.
An Inspected and Tested Wrench. The
Ironclad "COES" Guarantee for Strength
and Finish.**

**The "COES" Automobile Model are for Motorists
and Repairmen. For Service Specify "COES" No
Tool Kit or Repairshop is Complete Without One.**

**Ease of Handling Without Fear of Slipping or Bruis-
ing. Perfect Balance and Certain Grip has made the
"COES" the Most Widely Used Tool of the Kind in
the World.**

COES WRENCH CO.

WORCESTER MASS.

J.C. McCARTY & CO.

JOHN H. GRAHAM & CO.

29 Murray St. New York City

113 Chambers St. New York City

When Writing to Advertisers, Please Mention The Automobile Journal.

CROSSING THE ROCKIES ON POLARINE

The steep, rocky grades and snowy passes of this long trip through the Rockies, demanded an oil that cylinder heat would not break up, that would not congeal, that would keep the engine running true and strong. The oil chosen was

POLARINE

The standard oil for all motors—the oil for your car.

Use Socony Motor Gasoline

STANDARD OIL CO. OF NEW YORK

NEW YORK
BUFFALO

ALBANY
BOSTON

Polarine



DISTRIBUTORS

Rayfield ...
Carburetors
 Mea Magnetos
Seamless
Tires ...
Success
Dry Cells ..
 Garage Air
Compressors
Success..
Spark Plugs



Klaxon ...
Electric Horns
Automobile
Springs ...
Machine and
Hand Tools..
Overhead
Washers ..
Gasoline
Storage ..
Systems

A CORNER OF RETAIL DEPT

CAR SERVICE

DEPENDS ABSOLUTELY UPON EQUIPMENT

WAITE'S Mammoth Stock of Guaranteed Supplies and Accessories, for the Car, the Garage, the Shop, and WAITE'S Quick Service, Offers the Best the Industry Produces.

WAITE'S Big Catalogue, Describing, Illustrating and Pricing Every Motor Vehicle or Service Necessity, Utility or Convenience, Is an Encyclopedia of Information. A Postal Will Bring You a Copy.

WAITE'S Is the Largest EXCLUSIVE Automobile Supply House in New England. Three Minutes to Every Shipping Facility Means Quickest Delivery. We Serve Patrons Efficiently in All Parts of the East.

WAITE'S Catalogue Means Economy in Buying, WAITE'S Guarantees Are Ironclad, WAITE'S Adjustments Are Liberal, WAITE'S Service Cannot Be Equalled, WAITE'S Buying Resources and Jobbing Connections Are Unlimited.

No Order Too Small to Receive Fullest Attention.

Dealers' and Agents' Catalogue and Trade Price List Now Ready for Distribution.

WAITE · AUTO · SUPPLY · CO

Telephone
 Union 1771-3711

81 EXCHANGE STREET, PROVIDENCE, R. I.

Cable
 "Waaco"

(When Writing to Advertisers, Please Mention The Automobile Journal.)



MOTOR PARTS COMPANY

OFFICIAL
BOSCH
DISTRIBUTORS

QUALITY · EFFICIENCY · SERVICE

The demand for a product becomes general as its quality becomes known, its efficiency is determined and its service is a matter of record.

Quality goods in the hands of an efficient organization promoted for real service are the foundation of true growth and business success.

Such an organization we have established and we invite every dealer to avail himself of our facilities. We give real individual service with every sale.

MOTOR PARTS COMPANY

BOSTON

SPRINGFIELD

BUFFALO

PHILADELPHIA

Zenith Carburetors

Leak-Proof Piston Rings

Kemco Fan Type Generators

Mohawk Tires

(When Writing to Advertisers, Please Mention The Automobile Journal.)



EAGLEINE

The Motorist's Measure Is His Repair Bill

The dealer who sells EAGLEINE NO-CARBON OIL sells quality.

The owner who buys EAGLEINE NO-KARBON OIL buys quality.

The engine lubricated with EAGLEINE NO-CARBON OIL gives Quality, Service and Power.

EAGLEINE NO-CARBON OIL—An oil refined to afford the highest degree of lubrication, proven by years of use by experienced motorists, and sold with a guarantee of satisfaction wherever used. It costs no more than inferior brands.

Any owner who buys unknown quality oil takes all the chances; his repair bills, his pleasure, his satisfaction depend on QUALITY OIL.

EAGLE OIL & SUPPLY CO.
104 BROAD ST. BOSTON MASS.

(When Writing to Advertisers, Please Mention The Automobile Journal.)

What are you doing for the engine of your car?

No matter how good service it is giving you at present, it will continue to do so only if you treat it right—it **MUST** have the kind of oil that suits its lubricating system.

There are nine distinct systems of lubrication in general use. No one grade of oil can suit them all. A lubricant which is exactly right for one system may fail to lubricate properly an engine using another system. The result is likely to be an engine fit for the junk heap before its time.

Platt & Washburn Refining Company has spent thousands of dollars in physical and chemical laboratories in a study of all brands of motor oils on the market and scientific research by actual tests into the requirements of automobile engines.

The result of these tests is **Veedol** and the **Veedol Lubrication Chart**. Veedol is highly refined from Pennsylvania paraffine petroleum—the result of over 30 years experience with lubricating oils. The Chart will give you information which may double the life of your car. Get a copy from your dealer, or write us for one.

Platt & Washburn Refining Company

Established 1878 Incorporated 1885

7 BROADWAY

88 Broad St., Boston

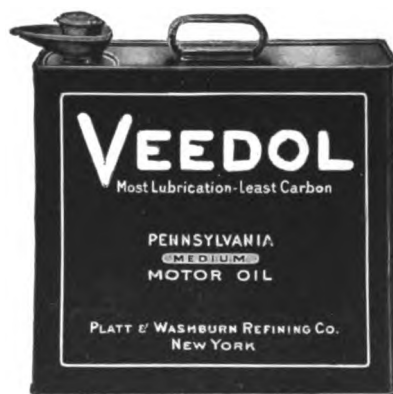
NEW YORK

Delaware and Greene Aves., Philadelphia

TO DEALERS: We want responsible representatives everywhere for Veedol. If there is no agent near you, write at once for terms and full information about the intensive co-operative selling plan by which we are introducing Veedol to car owners in your neighborhood.

The Nine Systems of Lubrication

1. Full Splash
2. Splash with Circulating Pump
3. Pump Over and Splash
4. Force Feed and Splash
5. Pump Over
6. Separate Force Feed
7. Force Feed
8. Full Force Feed
9. Knight Slide Valve Motor



(When Writing to Advertisers, Please Mention The Automobile Journal.)

Inside Facts of Standardization

Come on the inside with us. Let us show you how and why, dollar for dollar and car for car, you never before bought the equal of the three new Coles. Let us give you the simple two-and-two-are-four facts which make it possible for you to buy the new Cole Ten Four at \$1665, the new Cole Little Six at \$1865 and the new Cole Big Six at \$2465. Here is why we can build cars at a lower cost and sell them at two-thirds less the usual margin of profit.

Cole buys units from the specialists for less than they could be made in the Cole factory.

And Cole gets with those units the best ideas of the biggest and best unit-specialists, all of whom in turn have the benefit of the counsel and co-operation of the Cole staff of automobile engineers.

Cole engineering adds all these units to the dominant Cole idea, securing for you the combined saving of cost and the combined betterment of product.

The unit-specialist makes a legitimate profit and produces a perfect unit. Cole makes a legitimate profit, which does not have to be huge, because Cole eliminates the burden of carrying a vast investment.

Thus Cole can give the motorist every modern improvement instantly, because Cole draws upon every resource of the specialists who have proven themselves best in their lines.

Today the greatest Cole triumph is the ability to build three sizes of cars and have them all of the same class, selling them at prices which represent simply the difference in the cost of building.

Standardization means simplification, systematization and centralization. Aside from Cole's purchasing power it necessarily enables Cole to build at a lower cost.

To build up the Cole units in one factory for Cole exclusively would require millions of investment and tie those millions up.

Standardization permits the turning of \$1,000,000 ten times in a year, where non-standardization would need \$3,000,000—which could be turned but three times in the same volume of business.

Because Cole capital can be turned three times to non-standardization's once, it is plain that Cole can build cars with but 33⅓% the average investment, and consequently can sell them at 66⅔% less the usual profit margin, and still be "even".

Dollar for dollar and car for car, you never bought the like of these three new Coles—and you have just read the dollar-and-cents reason for this.

Now let the Cole itself tell you the rest of its story—the story of perfect service provided for you by Cole standardization. We will gladly demonstrate the cars.

"Why the Standardized Car?"

Write today for our new booklet, "Why the Standardized Car?"—which tells you in everyday language why Cole is the car you should buy.

Cole Motor Car Company
Indianapolis, U. S. A.



New Big Six
\$2465

New Little Six
\$1865

New Ten Four
\$1665

(When Writing to Advertisers, Please Mention The Automobile Journal.)

GAULOIS TIRES



QUALITY—ECONOMY—COMFORT

THE HIGHEST GRADE TIRES KNOWN TO THE MOTORING WORLD

GAULOIS TIRES Are Made to Afford Extreme Service.

GAULOIS TIRES Are Made to Endure in All Driving Conditions.

GAULOIS TIRES Are Made to Meet the Needs of the Owner Who Wants Reliability, Endurance and Maximum Comfort While on the Road.

GAULOIS TIRES ARE THE BEST THE EXPERTS OF THE WORLD CAN PRODUCE.

GAULOIS TIRES, DESPITE THEIR QUALITY, COST NO MORE THAN ORDINARY TIRES.

GAULOIS TIRES GIVE THE MOTORIST THE LARGEST VALUE THE MOTORING WORLD HAS EVER KNOWN.

If Not Stocked by Your Dealer, Write Direct.

GAULOIS TIRE CORP.

49 West 64th Street

NEW YORK CITY

Boston, Mass.: ELLIS WARD CO., 87 Boylston Street.
Canadian Agency: 325 St. James Street, Montreal, P. O.
Pacific Coast Distributor: Auto Motor Equipment Co., Los Angeles, Cal.



(When Writing to Advertisers, Please Mention The Automobile Journal.)

**LARGEST EXCLUSIVE AUTOMOBILE ACCESSORY
DEALERS IN CENTRAL NEW ENGLAND**

**SCIENTIFIC VULCANIZING
LARGEST VULCANIZERS OF TIRES AND TUBES IN THE EAST**



**ALSTEN &
GOULDING CO.**
*Automobile
Supplies*

**High Grade Standard Motor Car
Accessories and Supplies.**

We have what you want when you need it and
what we sell is backed by our guarantee as to
quality and price.

Your patronage is solicited. No order too large
or small to receive careful and prompt attention.

The house of quality goods at right prices.

**36 FOSTER STREET
WORCESTER, MASS.**

**WE PAY CARTAGE ONE WAY
MOST COMPLETE VULCANIZING PLANT IN NEW ENGLAND**

A POSTAL WILL BRING OUR NEW, BIG 1914 CATALOG AND CONSUMERS' CASH DISCOUNT SHEET

(When Writing to Advertisers, Please Mention The Automobile Journal.)



**Great Efficiency,
Small, Compact Size
and Low Cost**

**ARE THREE OF THE
MANY ADVANTAGES
OFFERED BY THE**

Tri-Phoon Air Pumps

for attaching to motors

for use in garages

The TRI-PHOON is an absolutely new three-cylinder air pump, built upon original lines. It pumps with the force of a hurricane and is a marvel of efficiency, delivering at 800 R. P. M. a steady flow of pure fresh air equal to the pressure drawn from an air tank charged 115 pounds to the square inch.

Its construction is marked by both simplicity and durability. All parts are of high-grade material and are an advance over the usual pump construction. There is perfect lubrication and it cannot get out of order.

Both the individual and garage pumps are very compact, light in weight, easily attached or handled and are

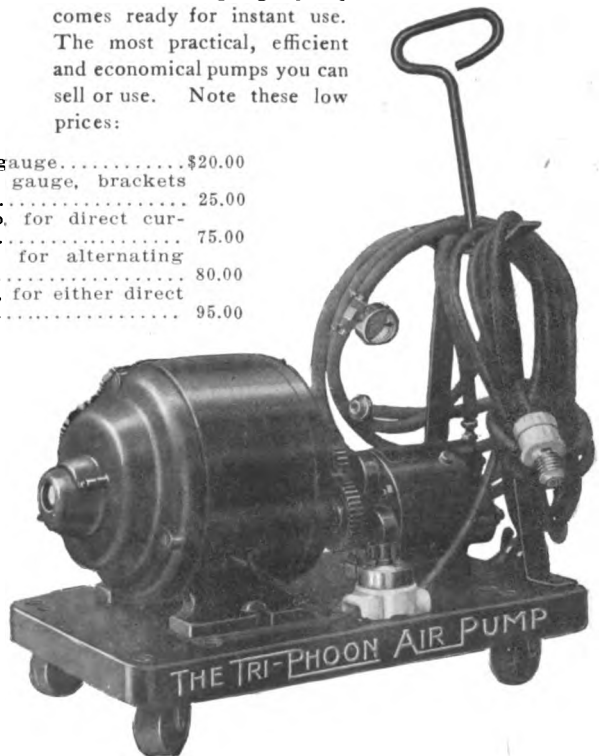
3-cylinder Air Pump, complete with hose and gauge.....	\$20.00
3-cylinder Air Pump, complete with hose and gauge, brackets and gears to attach.....	25.00
3-cylinder Electric Motor-Driven Garage Pump, for direct current	75.00
3-cylinder Electric Motor-Driven Garage Pump, for alternating current	80.00
6-cylinder Electric Motor-Driven Garage Pump, for either direct or alternating current.....	95.00

We have a very attractive proposition to offer dealers and jobbers.

Green & Swett Co., Inc.
Manufacturers
737 Boylston Street
Boston, Mass.

guaranteed for one year. They can be run at a high rate of speed without injury to working parts. The garage pump does not require a pressure tank, as the tires can be quickly inflated directly from the pump.

The motor pump is the lowest priced pump on the market, and can be attached to any car, the necessary brackets and fittings being furnished. The garage pump comes ready for instant use. The most practical, efficient and economical pumps you can sell or use. Note these low prices:

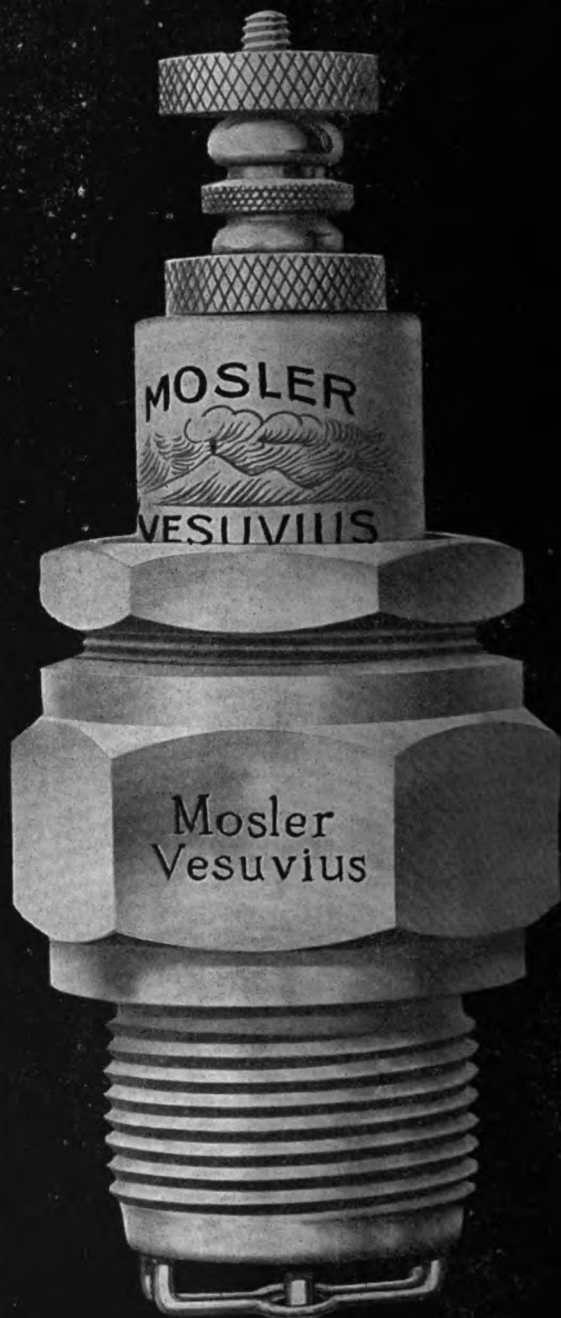


(When Writing to Advertisers, Please Mention The Automobile Journal.)



MOSLER SUPERIOR PLUG

insures the most satisfactory results in so far as a plug can affect the ignition on Ford cars.



MOSLER VESUVIUS PLUG

INDESTRUCTIBLE
POWERFUL and SURE
A plug that will last forever

A. R. MOSLER & CO.

New York, N. Y.

025BR

WHEN WRITING PLEASE MENTION THE AUTOMOBILE BUYERS REFERENCE



Mosler
Spit Fire
 SPARK PLUG

Trying any other plugs
 in the engine of your
 car is like trying to
 get a good smoke out
 of a poor cigar.

Don't experiment— use
 the "Spit-Fire"—you're
 sure then.

A. R. MOSLER & CO.
New York

Insist upon the **RED TAG**
 for absolute continued
 satisfaction.



024BR

WHEN WRITING PLEASE MENTION THE AUTOMOBILE BUYERS' REFERENCE.

SPEAKING of appreciation, several weeks ago over 350 Indiana citizens descended on our plant in a body and said they wanted to purchase over a quarter of a million dollars worth of Overlands on the spot.

Mind you, these men came to us unsolicited. And they had the cold cash in their pockets.

They took one day's entire production, and to make sure of their purchase each man drove his car home the same day.

That's appreciation in the finest sense of the word.



\$950 Completely
equipped

\$1075 With electric starter
and generator

Prices f. o. b. Toledo, Ohio

BRIEF SPECIFICATIONS:

Electric head, side,
tail and dash lights
Storage battery

35-horsepower motor
33 x 4 2. D. tires
114-inch wheelbase

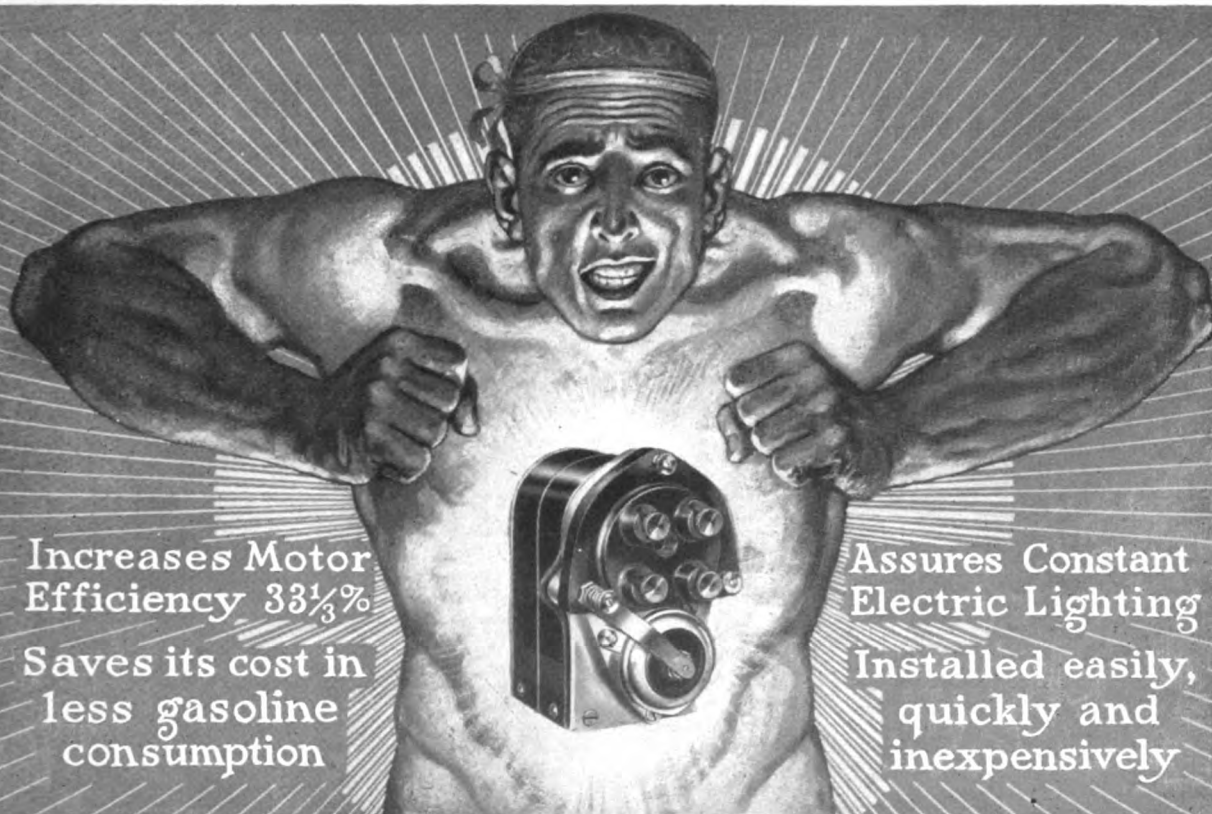
Mohair top, curtains
and boot
High-grade speedometer

Clear-vision, rain-
vision, windshield
Electric horn

The Willys-Overland Company, Toledo, Ohio

Manufacturers of the famous Overland Delivery Wagons, Gatzford and Willys-Utility Trucks. Full information on request.

(When Writing to Advertisers, Please Mention The Automobile Journal.)



Increases Motor Efficiency 33 $\frac{1}{3}$ %
Saves its cost in less gasoline consumption

Assures Constant Electric Lighting
Installed easily, quickly and inexpensively

WE ARE READY TO PROVE

to any owner of a Ford automobile the remarkable results to be obtained with the installation of a

Splitdorf Ford Special WATERPROOF HIGH-TENSION MAGNETO

If you want "the best out of the motor," don't hesitate—SPLITDORF FORD SPECIAL high-tension magnetos are giving thousands of the popular motors the response and flexibility of the highest-priced automobiles.

Enclosed direct gear-driven—no chains or open gears—the SPLITDORF waterproof high-tension magneto does away with vibrators, coils and batteries and gives truly remarkable results in supplying the constant hot, fat, juicy spark to the motor.

Everything you need for installation is supplied with the outfit. An illustrated book of instructions shows the comparative novice how he can install a SPLITDORF high-tension magneto in a few hours. This book will be SENT FREE upon request to the nearest Branch.



The SPLITDORF instrument is enclosed gear-driven—no chains or open gears

SPLITDORF ELECTRICAL COMPANY

ATLANTA 10-12 E. Harris St.
BOSTON St. Germain St., and Mass. Ave.
CHICAGO 64-72 E. 14th St.
CINCINNATI 811 Race St.
DALLAS 402 S. Ervay St.

DAYTON 427 East 3rd St.
DETROIT 972 Woodward Ave.
KANSAS CITY 1827 Grand Ave.
LOS ANGELES 1215 S. Hope St.
MINNEAPOLIS 34 S. 8th Street

NEWARK 290 Halsey St.
NEW YORK 18-20 W. 63rd St.
PHILADELPHIA 210-12 N. 13th St.
SAN FRANCISCO 1028 Geary St.
SEATTLE 1628 Broadway

LONDON BUENOS AIRES TORONTO

Factory: NEWARK, NEW JERSEY

(When Writing to Advertisers, Please Mention The Automobile Journal.)

GUARANTEED! 20,000 TRADE DISTRIBUTION!

**THE JULY, AUGUST AND SEPTEMBER ISSUES
.... OF**



**THE GREATEST CIRCULATION EVER ATTAINED BY
ANY AUTOMOBILE TRADE PUBLICATION**

NO DUPLICATION OF CIRCULATION--NO QUESTION--NO GUESSING

**The Trade Publicity and Promotion
Service to Be Obtained in the**

ACCESSORY AND GARAGE JOURNAL

Is So Positive, at So Low a Rate, and So Assured by an Iron-Clad Guarantee as to Distribution, That Every Advertiser Desiring to Reach the Entire Trade of the Country Must Be Interested in Details and Proof of Service. We Invite Requests—Send Yours Today.

The Accessory and Garage Journal

Times Building

Pawtucket, R. I.



SPEDOLENE

Designed Especially for
Gears ∴ Transmissions ∴ Differentials
Timing Gears ∴ Bearings ∴ Worm Gears

"THE LUBRICANT THAT KILLS HEAT"

Why you should use SPEDOLENE:

- FIRST** — It is made of the very finest grades of materials, a foundation particularly adapted to gears in automobiles and motor trucks. Purely a mineral compound, clean and wholesome; has no corrosive action, contains no animal matter, fats, greases, acids, lye, soda or water.
- SECOND** — Every process of its manufacture is carefully and thoroughly tested. This insures to the user **quality** that is absolutely uniform. **Spedolene** never varies and "every ounce counts."
- THIRD** — The indorsement of **Spedolene** users is the most convincing testimony regarding the high efficiency of this lubricant. Purchasers of **Spedolene** praise this lubricant in the most enthusiastic terms.
- FOURTH**—**Spedolene** positively eliminates gear noises. **Spedolene** does not run out or throw out at the gear cases. **Spedolene** lubricates under any temperature. **Spedolene** lasts longer than any other known oil, grease or compound, and has revolutionized the gear lubricating problem of the country in less than three years, and is unquestionably the greatest success in the shortest period of time, in the history of lubrication. You are actually overlooking **economy, efficiency and real gear lubrication** if you do not use **Spedolene**.

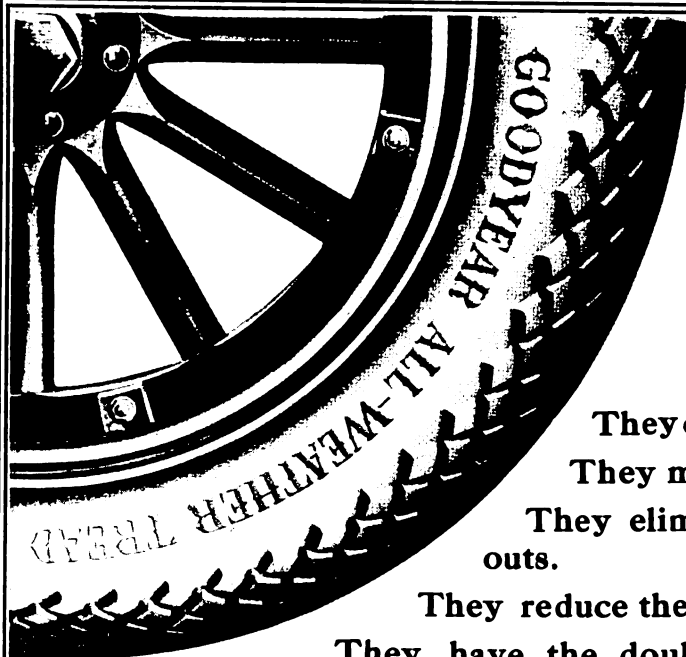
Let your car be the judge
Used extensively in foreign countries

DEALERS—write for quotations and other data you require. We need an agent in every town, city and state. Literature, descriptive of **Spedolene**, gladly sent you on request.

Continental Asbestos Corporation
Manufacturers of Asbestos Lubricants, etc., **Spedolene**, **Journolene**,
Asbestolene, **Cupolene**, **Axolene**, **Gearolene**
Worcester, Mass., U. S. A.



(When Writing to Advertisers, Please Mention The Automobile Journal.)



These Tires

Outsell Any Other

They cost you less than 16 other makes.

They make rim-cutting impossible.

They eliminate the cause of most blow-outs.

They reduce the loose-tread risk by 60 per cent.

They have the double-thick All-Weather treads—the ideal anti-skids.

These are exclusive features.

That's Why Goodyears Rule

For many years, scores of experts in our laboratory have worked to perfect these tires. Their efforts have cost us \$100,000 per year.

They have built a tire which marks the present-day limit in low cost per mile.

In this tire we embody four great features found in no other tire.

Men found these tires out and told others. The demand doubled and doubled, until this tire

became the most popular tire in the world.

Then the cost came down with this multiplied output, until these tires now sell below 16 other makes. Some are one-third higher.

These tires offer, at the lowest price possible, the utmost in a tire. You

will get that always in a Goodyear. And any dealer will supply you Goodyears when you tell him you want these tires.

GOOD YEAR
AKRON, OHIO

No-Rim-Cut Tires

With All-Weather Treads or Smooth

THE GOODYEAR TIRE & RUBBER CO., Akron, Ohio
Toronto, Canada London, England Mexico City, Mexico

DEALERS EVERYWHERE

Branches and Agencies in 103 Principal Cities.

Write Us on Anything You Want in Rubber

(1657)

(When Writing to Advertisers, Please Mention The Automobile Journal.)

Prest-O-Lite

is
to

You don't have to find satisfactory light.

You don't have to leave your repair shop---pay for continuing wait for an "expert" to see

The Sure Cure for Lighting Troubles

NOW
is the time
to change

You don't have to fool along with unsatisfactory light.

You don't have to leave your car in the repair shop—pay for continuous "service" or wait for an "expert" to search for mysterious troubles.

Get Safe, Saving, Satisfactory Prest-O-Lite

Follow the example of thousands of other wise motorists. Tell your dealer to take out all the experimental, complicated, delicate, unsatisfactory system and go back to Prest-O-Lite.

Did you ever hear of the same electric lighting system being used on the same make of car for more than a year?

Prest-O-Lite saves weight, gives greater engine power, never fails suddenly, is free from trouble and repairs, needs practically no attention.

Your gas lights may be lit, dimmed or extinguished, from the seat, by the use of the Prest-O-Liter.

USE THE COUPON

If you want the **facts** on all lighting systems, showing how you can save time, money and trouble on **YOUR** car—use the coupon today.

The Prest-O-Lite Co., Inc.

226 Speedway, Indianapolis, Ind.

(Contributor to Lincoln Highway)

EXCHANGE AGENCIES EVERYWHERE

No matter what self-starter is on your car, your headlights should be gas lights. Reliable light is just as essential as fuel.

(210)

**The
Prest-O-Lite
Co., Inc.**

226 Speedway
Indianapolis - - Ind.

Please send me complete information on automobile lighting to:

(When Writing to Advertisers, Please Mention The Automobile Journal.)

There's no leak proof ring but the **LEAK-PROOF** Ring — insist



GUNS and Cylinders

The purpose of the explosion is the same. In the gun it drives out the projectile—in the cylinder it drives down the piston head.

To obtain the full effect of the explosion in the gun the projectile is held with a flanged metal band around the rear end. This prevents the escape of the expanding gases.

The piston ring is used for the same reason. To secure such exact fit of piston head to cylinder as will make any loss either of compression or explosion impossible. In addition, the really efficient piston ring must eliminate destructive friction and at the same time keep surplus oil out of the combustion chamber.

LEAK-PROOF Piston Rings

MADE BY MCQUAY-NORRIS MFG. CO.

comply fully with all these specifications.

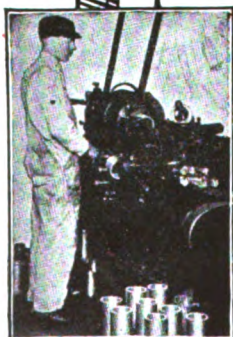
The **LEAK-PROOF** Piston Ring is a two-piece ring—strong, simple, easy to adjust. Each half concentric and interlocking with the other—sealing all openings. Made of special metal possessing great and enduring elasticity. Finished to gage as accurately as constant and careful micrometer testing can make it.

LEAK-PROOF Rings obtain absolutely firm and equal bearing on all parts of the cylinder. Their use ensures perfect compression and full power—reduced carbonization—fuel economy and longer motor service.

Send for Free Booklet—

It tells all about piston rings and why you should equip your engine with the **LEAK-PROOF**. How it will pay you in fuel economy and prolonged motor life. Write for it.

"Ask the User"



Forming the Rings

The rings are formed and cut from the casting on this machine. The output of each machine is about 150 rings per day—a ridiculously small number until the care and exact measurements that must be applied to this operation are taken into consideration. The forming tools are watched very closely and the rings are made with a variation of less than a one-thousandth of an inch.

LEAK-PROOF Piston Rings are leak-proof because such exactness is made a principle in their manufacture.



The Name
LEAK-PROOF
Stamped On
Every Ring

**In Use on
Over 200,000 Automobiles
and Motor Boats**

**Sold by all up-to-date
dealers, garages, repair shops
and marine stores**

Manufactured by
MCQUAY-NORRIS MANUFACTURING CO., Dep't. D.

St. Louis, Mo.

New York—1919-29 Broadway at 64th St.
Pittsburg—7620 Tioga St.
Kansas City—513 New Nelson Bldg.

Chicago—Suite 718 Michigan Blvd. Bldg.,
Michigan Ave. and Washington St.
San Francisco—164 Hanford Bldg.

Los Angeles—224 Central Bldg.
Canada—W. H. Banfield & Sons,
No. 120 Adelaide St. West, Toronto.

2-A

for the name **LEAK-PROOF stamped on the Ring**

SOLOMON,

THE WISEST MAN IN THE WORLD,

built the temple at Jerusalem so that it was the wonder and admiration of all the surrounding tribes. This was appropriate to his day. In like manner there is now being constructed in old Germantown, Philadelphia, an automobile brake lining that is the wonder of present-day engineers as to its unusual durability and resistance power. It is made from highest quality, long fibre asbestos and brass wire, both fireproof and indestructible materials, **VERY COMPACTLY** woven on our own looms; treated through and through with a special compound, giving it the same coefficient of friction until entirely worn out, and at the same time making it impervious to the action of heat, water, oil or gasoline. It is then compressed to exact size under massive steel rollers.

S-M-C asbestos brake lining *has recently been improved*, and today we can conscientiously say it is the highest standard of brake lining it is possible to make. We strongly recommend it to the most critical trade, who are wise enough to want quality in preference to price. When properly used we absolutely guarantee it to give entire satisfaction in every instance; otherwise, we will refund money, plus 10% interest. Could we afford to offer such a guarantee on an inferior article? **S-M-C MUST** give satisfaction, **OR WE WILL.**

NEXT TO QUALITY, PRICE IS A BIG CONSIDERATION, but by comparison it will be found that prices on S-M-C are lower than on any other brake lining on the market today—quality and workmanship considered. If your dealer does not handle S-M-C, advise us his name and address and we will send you a trial order at less than wholesale price so that you may become familiar with the high quality of S-M-C. **WE HAVE A SPECIALLY INTERESTING PROPOSITION TO DEALERS.**

Would you give your tailor \$20 for making you an all-cotton suit; with only about \$5 real, intrinsic value, and never dependable? **WELL, HARDLY!** Then why pay a high price for equipping your car with an inferior brake lining when you can get the highest quality material for the same price, thus insuring yourself of constant safety? Is "**SAFETY**" worth anything to you? A little consideration should convince the most skeptical motorist, when he needs brake lining again, that he should get

"SOMETHING MOR'N COTTON"

Manufactured and guaranteed by

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S-M-C

(When Writing to Advertisers, Please Mention The Automobile Journal.)



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AUTOMOBILES

WOODWARD AND WARREN AVENUES

EXECUTIVE AND SALES OFFICE

DETROIT, MICH.

June
26th
1914.

THE NEW 1915 MAXWELL "25."

EXTREMELY IMPORTANT TO DEALERS IN AUTOMOBILES.

Between July 15th and August 1st we shall announce, - place upon display and exhibit our new 1915 Maxwell "25," to retail at \$750.

We shall begin the distribution throughout the country of this new 1915 "25" model by August 1st.

We confidently expect to be able to build 60,000 of these new 1915 "25" models retailing at \$750. within one year.

We shall do all that human endeavor and our immense factory facilities can do to build at least 60,000.

I confidently predict that this new Maxwell "25" retailing at \$750. will be the greatest sensation that the automobile world has ever known.

I base this prediction upon the car from the ground up - its chassis; its motor; the lines and size of its body; and the unexpected extra and additional features which will be placed upon this car.

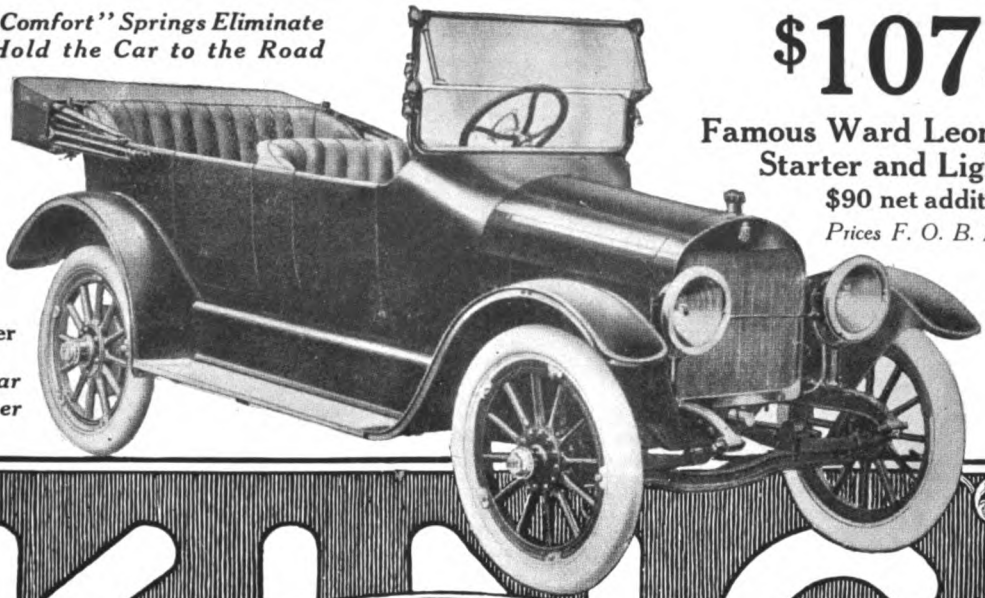
Walter E. Sanders.

President,

Maxwell Motor Co., Inc.

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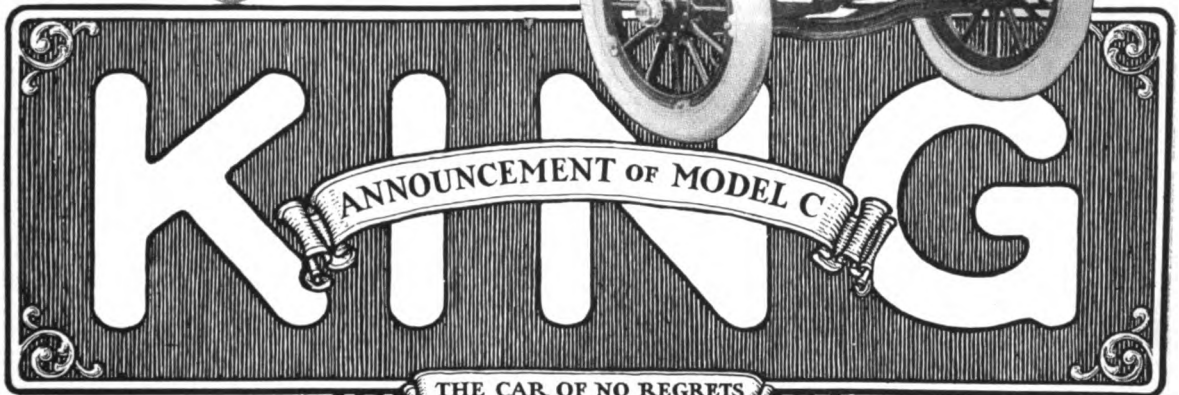
Cantilever "Comfort" Springs Eliminate Jolts and Hold the Car to the Road



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Horsepower
—
Touring Car
and Roadster

\$1075

**Famous Ward Leonard
Starter and Lighter**
\$90 net additional
Prices F. O. B. Detroit



THE CAR OF NO REGRETS

Pure European stream line body.
Flush "U" doors. No moldings.
Concealed hinges and latch handles.
Full floating rear axle.
Combination head lamps.
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Special crown fenders.
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113" wheel base.
Center control.

**New price, new body,
new chassis refinements, but
retaining all the sturdiness, reliability,
and special mechanical features that made
the 1914 model a success the world over.**

The KING chassis has always been built to give many years of faithful, economical service. Now it comes with a body of a type pronounced by the majority of engineers to be the *ultimate* motor car design. In Model C you will be buying for a decade.
All stock of the KING MOTOR CAR COMPANY is owned by the active executives of the Company. These stockholders prefer solid, successful growth rather than large, immediate profits. To this end they insure careful, high grade manufacturing by including every employee in an annual distribution of profits. The KING was first to do this. With this painstaking and responsible manufacture, good materials of such high quality that only by cash buying and modest profits can such a price as \$1075 be made possible.

Multiple disc cork insert clutch.
True ventilating, rain-vision wind-shield.
Extra deep tilted cushions.
Silk mohair one-man top.
Option on two gearings.
Flush-top upholstery.
Gemmer steering gear.
Stromberg carburetor.
3 1/2" x 5" motor.
Extra heavy frame.
18" steering wheel.
Full equipment.

Dealers Should Not Delay

in arranging for territory yet unallotted. The KING'S 1914 success is about to be repeated manifold. A handsome, dependable, economical car of popular name and price, produced by a financially solid factory, and generously advertised, is a combination that will mean big 1915 profits.

King Motor Car Company

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New York Agency and Showroom, Broadway at 52nd St.
New York Service Department, 244-252 West 54th St.



KING MOTOR CARS are operating efficiently and economically in England, Germany, Australia, India, Switzerland, Guatemala, Philippine Islands, New Zealand, Chile, South Africa, Uruguay, Java, Martinique, Colombia, Sweden, Brazil, Ceylon and Denmark

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PUBLISHER'S AND READER'S PAGE.

Special Attention is directed to the advertising sections in this issue, in which are listed the latest devices making for comfort and convenience on the tour, as well as standard supplies and accessories. When writing advertisers always mention The Automobile Journal, as it will insure prompt attention.

The 1915 Models are being announced by the manufacturers. In keeping with its policy to keep its readers informed of the changes and improvements made in the new designs, The Automobile Journal will present in each issue descriptions of the late models. Manufacturers are invited to forward photographs and specifications for publication.

Always Consult The Buyers' Guide, on pages 170-178, inclusive, whenever in need of anything new in cars, accessories, supplies or fittings. It is an authoritative list of the reliable concerns in the industry. These are alphabetically arranged, making it an easy matter to obtain the name and address of the maker of the material desired.

Regular Departments of The Automobile Journal will be found on pages 99-166 inclusive. Special attention has been paid to the needs of the owner in preparing the motor car for the tour, and the suggestions made for obtaining the fullest measure of satisfaction, economy and efficiency from the machine are wholly practical. The novice will note many valuable hints for correcting minor troubles upon the road. The discussion upon carburetors and ignition have been compiled especially for to meet the need of those not familiar with these subjects.

As An Owner's magazine The Automobile Journal aims to present that which will not only meet with the approval of motor car users, but afford them every opportunity for becoming intimately acquainted with the products of the industry. Particular attention is called to the department for new owners, which is educational in its scope and explains in non-technical language the construction, operation, care and maintenance of the automobile. The subjects are well illustrated.

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Safety does not depend merely on how fast or slow you drive, but on how well you have your car under control.

A speed of 30 miles an hour in a car equipped with Multibestos Brake Lining may be far safer than 10 miles an hour in a car with ordinary brake lining which grips a second too late or "grabs" or checks the two wheels unevenly, causing a skid.

There is no question of the best brake lining. This point has been absolutely settled by engineering authorities who are impartial and unprejudiced. Let us send you signed reports of comparative tests showing that Multibestos has greater resistance to heat than any substitute.

This efficiency, which has never been equalled, is based on the firm, tight weave of purest long fibre asbestos and brass wire. When you want maximum power and flexibility, insist on Multibestos.



Write for Booklet

"Safe in the Grip of Multibestos"

It's of vital interest to every user of brakes.



**Standard Woven
Fabric Co.**

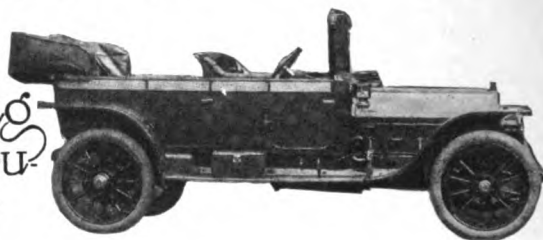
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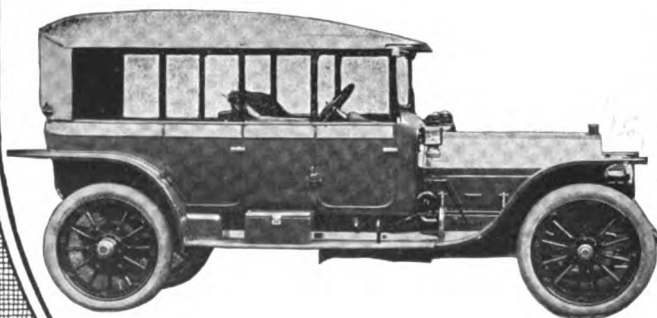
PHILADELPHIA, 1427 Vine St., N. A. Petry Co., Inc.
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The comfort of every car body combined. An instantaneously convertible equipment that affords a touring body or a limousine whenever desired.



Changes can be made on the road as readily as in the garage. No matter what the occasion or requirement, your car with the

SPRINGFIELD CONVERTIBLE BODY is always ready and always has



the accommodation and protection you desire.

Can be raised or low-

ered as easily as folding top.

SPRINGFIELD METAL BODY CO.

SPRINGFIELD

MASS.

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The Enjoyment of Your Tour Depends on Your Ignition

If your ignition system does not give you maximum results, if you experience that continual missing that racks engines and puts nerves on edge, if you don't obtain the economy and efficiency that only can be obtained by using a reliable magneto and dependable spark plugs, you can't enjoy your tour—you will not be satisfied.

BOSCH MAGNETO AND BOSCH PLUGS

make up the most popular ignition system. It has a world-wide reputation for supplying and delivering continuous unflinching sparks at the precise moment and of such intensity as to assure the utmost efficiency and economy.

An additional point—one of paramount importance—is that you can place complete confidence in your ignition if supplied by the Bosch System—you will have freedom from delays, you will have no expensive repairs, you will have absolute reliability and every drop of fuel you buy will be made to produce its utmost power.

All the Better Cars Use Bosch—You Can Have Bosch Too, ask your dealer.

Be Satisfied

WRITE FOR LITERATURE

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BOSCH MAGNETO CO., 204 West 46th Street, NEW YORK

Over 239 Service Stations That Really Serve

CHICAGO

DETROIT

SAN FRANCISCO

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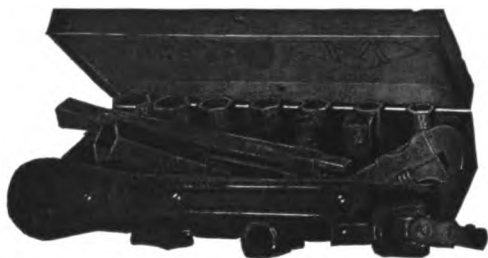


Finest Tools



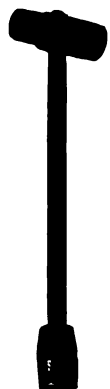
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The Ideal Wrenches for Garage or Shop Uses. A Full Utility Kit. Positively Will Fit All Adjustments on All Ford Automobiles.



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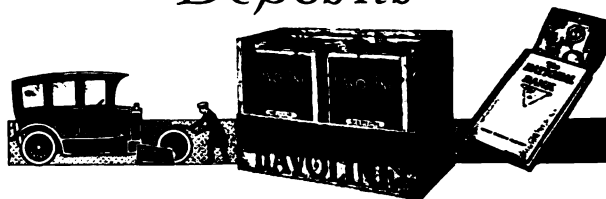
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"It Makes a Difference"

*in
Carbon and Bank
Deposits*



**Havoline Oil leaves the smallest
carbon deposit, because it burns
up evenly and cleanly.**

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who appreciate its never varying, superior quality; due to its being made from but one, uniform base crude of tested worth and to our

Special Process of Manufacture

which preserves the molecules of the oil yet frees it entirely from floating carbon and other impurities.

Write for our *New Price-Scale Policy*, which insures you the *continuous patronage* of your customers. By our *special contract plan* you are kept in closest touch with your trade for at least a period of one year.

Ask for our Booklet the "Lubrican" to distribute to your customers. It attracts orders!

Free subscription upon request for our publication the "Sales-Oiler," written especially to help you market your products.

Write today!

INDIAN REFINING CO.

Department "L"

NEW YORK

When Writing to Advertisers, Please Mention The Automobile Journal.

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REDUCE THE HIGH COST OF RUNNING YOUR AUTOMOBILE

By Buying Supplies at Less Than Manufacturers' Prices From the Original Price Wreckers and

WORLD'S LARGEST DEALERS

Following is a list of a few of our especially good values. It is not a complete list of our stock. Do not hesitate to call on us if you are in the market for anything not listed.

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Holley Carburetors.....2.50
Rayfield Carburetors.....6.50
Kingsdon Carburetors.....2.50 to 4.00
Slide Oil Lamps, per pair.....2.75
Electric headlights, regularly \$25, our price.....8.00 per pair
4 and 6-cylinder Gleanol imported magnetos, high-tension, regularly \$100 to \$150, our price.....15.00 and 20.00
Bosch low-tension magnetos.....3.00
Remy magnetos, model "S".....9.00
Splitdorf dual outfits, complete.....25.00
Magneto coils.....4.00 up
4 and 6-cylinder Connecticut coils.....12.00
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Stewart-Warner and Jones speedometers 12.00
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Mondex shock absorbers, per set of 4.....12.00
\$40 Disco starters.....5.00
Open and closed Ford delivery bodies.....25.00 and 50.00
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Prest-O tanks.....13.50 complete
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Universal joints.....5.00
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Electric horns, complete.....1.95
\$25.00 trunks.....5.00
Tire covers.....0.75 and 1.00
\$25.00 windshields.....12.00
Mohair dusters.....3.50
Chaufeurs' dusters.....1.00
Storm fronts and side curtains.....1.00
Applico Lighting System, complete, regular price \$75.00.....32.50
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Top covers.....2.50
Tire gauges.....0.35
Rollers, all sizes.....1.75 up
Single, double and triple action pumps.....0.75 up
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30x3 1/2 casings 9.55 Grey tube 2.95
32x3 1/2 casings 9.65 Grey tube 3.20
33x4 casings 13.80 Grey tube 4.00
34x4 casings 14.65 Grey tube 4.10
36x4 casings 14.85 Grey tube 4.40
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Springs, all sizes, at less than factory prices.
Motor driven electric horns.....7.50
We also have such goods as Klaxon horns, Weed chains, Splitfire Sootless spark plugs, and, in fact, everything for the automobile. Consult us before buying anything in the way of automobiles or supplies and send for our free price wrecker.

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TIMES SQUARE AUTOMOBILE CO.

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FOR SALE—1911 Peerless Touring Body, New Top, Fore Doors. Price reasonable. Inquire D. W. BELLOWS, 85 Park Place, Pawtucket, R. I.

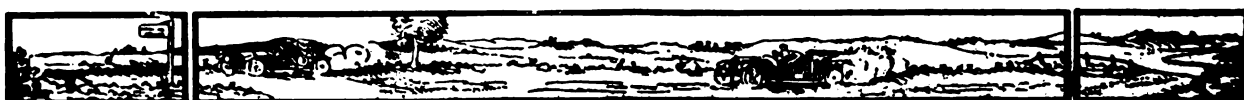
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WIZARD WASHERS

TIME
LABOR
ATTENTION

SAVE

EXPENSE
VARNISH
APPEARANCE

THE MOST PRACTICAL GARAGE UTILITY EVER DEvised. INSTANTLY SERVICEABLE WHEN REQUIRED. CAN BE OPERATED BY A WOMAN OR CHILD, WITH HIGHEST EFFICIENCY.

WIZARD WASHERS Economize Whenever Used. They Are as Necessary as Tools for Maintenance of a Car.

EVERY PART OF A CAR Can Be Reached With a **WIZARD WASHER**. Rotating Brushes, Driven by and Flooded with Water, Thoroughly Cleanse the Surfaces. The Finish is Absolutely Protected.

WIZARD WASHER OUTFITS Include a Nozzle Containing a Turbine Motor, One Conical and One Straight-Sided Brush, and a 12-inch Extension for Reaching Beneath a Car.

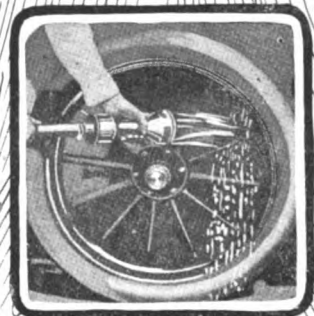
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WIZARD WASHERS Last a Lifetime. Will Afford Any Owner a Material Saving in Water Used, Time Required, Labor, and Will Do the Work Better. Will Save Their Cost in a Few Months.

Let Us Send You Information and Catalogue. A Postal Request Will Bring You Every Detail.

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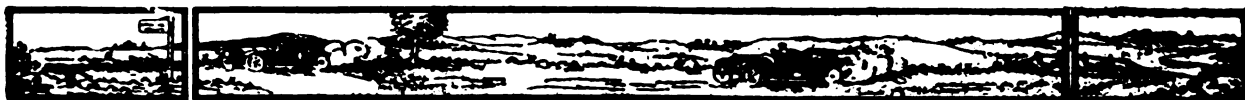
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(When Writing to Advertisers, Please Mention The Automobile Journal.)

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						Topeka, Kan.....	206	88



Make Every Stroke Count

Save your time, save your labor, economize your tires, and insure your comfort



Apex Three-Cylinder Pump
Price \$4.50

Tire Damage Is Certain

TIRE LEAKAGE means greater wear or destruction unless you keep the pressure at the standard.

A few strokes in time will save hundreds of tire miles and minimize your expense for shoes.



Zenith Two-Cylinder Pump
Price \$2.50

The APEX pump is the best in the world, and will inflate an average tire in 30 seconds. Will operate twice as fast as any other pump and very easily against full tire pressure. Gives a constant flow of air.

Length over all, 22 inches; three cylinders, $1\frac{1}{4}$, $1\frac{1}{4}$ and $\frac{3}{4}$ -inch 20-gauge seamless brass tube; Bessemer steel plunger rods, with "B" leather plunger washers; base heavy gray iron, gold finish.

It is fitted with 24-inch five-ply hose and quick operating nipple connections.

The ZENITH pump is the best two-cylinder pump made. Perfectly designed, with two inches longer stroke, it will fill any tire in a minute or less.

Length over all, $22\frac{1}{2}$ inches; two cylinders, $1\frac{1}{2}$ and $\frac{3}{4}$ -inch 20-gauge seamless brass tube; Bessemer steel plunger rods, with "B" leather plunger washers. Base heavy gray iron, gold finish.

It is fitted with 24-inch five-ply hose and quick operating nipple connections.

The APEX and the ZENITH are the most efficient hand tire pumps built. Their efficiency is nearer to that of power compressors than is that of any other form of hand pump. They are constructed of the finest materials and will give years of service. They are compact and easily carried. They can be efficiently operated by a woman or a boy.

■ The APEX pump is constructed for the owner who wants the best that can be made and UNDERSTANDS THE VALUE OF QUALITY. It costs no more than pumps of inferior qualities.

The ZENITH pump sells for a lesser price, but it has QUALITY EQUAL TO THE DESIGN that is found in the APEX pump. It costs no more than pumps of inferior qualities.

Sold by dealers generally, or direct by the manufacturer.

A worth while contract for exclusive New England distribution to a well established trade can be made by a representative concern. This is a proposition that can be made to develop large profits.

Buffalo Auto Accessory Manufacturing Company

269 Ellicott Street

Buffalo, N. Y.

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Tucson, Ariz.....	202	81	76	Waterbury, Vt.....	31	34	34	Winchester, Va.....	100	69	68						
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				Waterville, Wash....	203	84	76	Winooski, Vt.....	31	34	34						
Upton, Me.....	22	28	26	Watkins, N. Y.....	53	54	54	Winston-Salem, N. C...	100	65	68						
Utica, N. Y.....	51	47	47	Waukegan, Kan.....	201	77	76	Woodstock, N. B....	12	20	20						
				Walser, Idaho.....	208	91	76	Woodstock, N. H....	22	28	26						
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				Wheeling, W. Va....	100	60	68										
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KEY TO ROUTE INDEX.

AS EXPLAINED elsewhere, the itineraries listed in this Eighth Annual Touring Number have been prepared with a view to connecting all sections of the country, so that it should be possible to start from any point and reach any other point. The several routings presented below indicate the manner in which the itineraries in this number may be utilized in planning additional tours. Obviously, it would prove impracticable to list more than a very small proportion of the possible tours which might be arranged in this manner, and it is assumed that with this guide the tourist will have no difficulty in making his own plans as he desires. However, The Automobile Journal is prepared to lend every assistance upon request.

It should be understood that routes marked "R" are to be followed in a REVERSE direction.

TRANSCONTINENTAL TOUR A. (The Lincoln Highway.)

New York to	Route	Page	Miles
San Francisco.	1	5	3174.7

TRANSCONTINENTAL TOUR B.

New York to	Route	Page	Miles
Pittsburg	1	5	400.3
Cincinnati	100R	69	287.7
Indianapolis	152	74	124.0
St. Louis.....	153	74	243.5

Colorado			
Springs	201	75	869.3
Phoenix	207	89	872.8
Los Angeles.....	202	81	569.2

Total Mileage.....3366.8

TRANSCONTINENTAL TOUR C.

New York to	Route	Page	Miles
Chicago	1	5	897.1
Seattle	203	81	2488.3

Total Mileage.....3385.4

TRANSCONTINENTAL TOUR D.

New York to	Route	Page	Miles
Salt Lake City	1	5	2512.6
Seattle	208	90	1001.0

Total Mileage.....3513.6

TRANSCONTINENTAL TOUR E.

New York to	Route	Page	Miles
Albany	50R	44	157.7
Buffalo	52R	52	307.6
Chicago	151	71	580.0
Salt Lake City..	1	6	1615.5
San Francisco..	201	78	978.0

Total Mileage.....3638.8

TRANSCONTINENTAL TOUR F.

New York to	Route	Page	Miles
Philadelphia ..	1	5	101.5
Washington ..	63	65	152.4
Tuscumbia	100	66	1114.7
Memphis	102	70	159.4
Los Angeles....	202	79	2423.7

Total Mileage.....3951.7

TRANSCONTINENTAL TOUR G.

New York to	Route	Page	Miles
Pittsburg	1	5	400.3

Cincinnati	100R	69	287.7
Indianapolis	152	74	124.0
St. Louis	153	74	243.5
Topeka	201	75	378.0
Fort Worth.....	206	88	724.5
Los Angeles	202	80	1804.0

Total Mileage.....3962.0

TRANSCONTINENTAL TOUR H.

New York to	Route	Page	Miles
Nanuet	50R	44	28.5
Suffern	61R	62	8.3
Binghamton ..	54	56	161.0
Elmira			63.5
Buffalo	60R	60	154.6
Chicago	151	71	580.0
St. Louis.....	153R	75	433.8
San Francisco..	201	75	2604.2

Total Mileage.....4033.9

ALBANY, N. Y.-GETTYSBURG, PENN.-WASHINGTON, D. C.

Albany to	Route	Page	Miles
Poughkeepsle..	50	44	74.5
Philadelphia ..	61	63	198.9
Gettysburg ...	60	59	118.7
Washington ..	63	66	77.7

Total Mileage.....469.8

ALBANY, N. Y.-WHITE MOUNTAINS, N. H.-MOOSEHEAD LAKE, ME.

Albany to	Route	Page	Miles
Springfield	41	38	93.7
Bethlehem	31R	34	217.1
Rangeley Lakes	11	16	129.3
Moosehead Lake	14R	23	135.6

Total Mileage.....575.7



\$20.00 Ready to Install

4 Mott Wire Wheels for Ford Cars

**MOTT
QUALITY**

**Built
for
Ford
Cars**

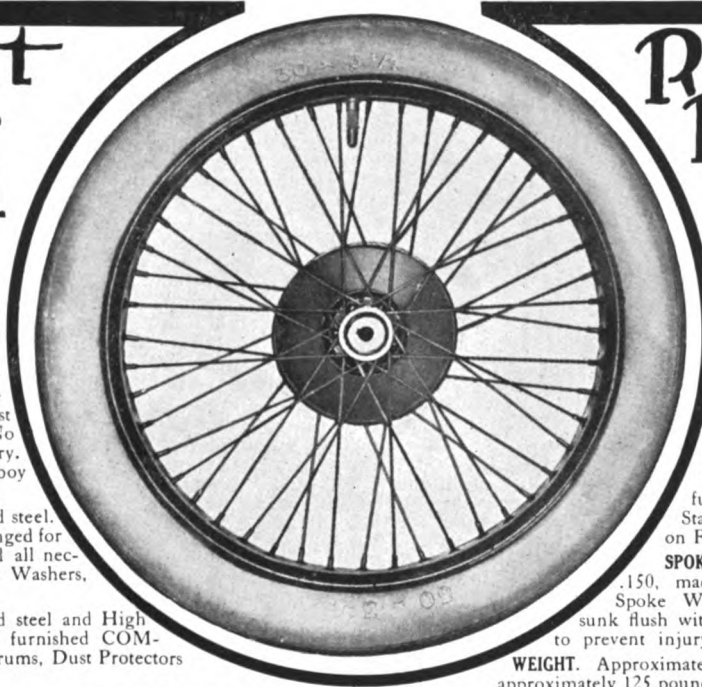
SPECIFICATIONS

MOTT WIRE WHEELS are furnished complete with Ballcaps, Balls, Dust Protectors and Caps. No machine work necessary. Fifteen-year-old schoolboy can make the changes.

FRONT HUBS. Pressed steel. Right front hub is arranged for Speedometer gear, and all necessary Bolts, Nuts and Washers, Etc., are provided.

REAR HUBS. Pressed steel and High Grade Malleable Iron furnished COMPLETE with Brake Drums, Dust Protectors and Caps.

IMPORTANT. In ordering REAR HUBS state length of BORE "A" (See Cut below) in wood wheel hubs that are to be replaced



**Right
Price
for
Ford
Cars**

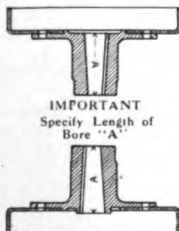
SPECIFICATIONS

RIMS. Light Section steel made specially for these wheels. 30 in. x 3 1/2 in. Rims regularly furnished on all wheels. State if you wish 30 in. x 3 in. on Front Wheels.

SPOKES. Swaged, size .175-.150, made of the Best Grade of Spoke Wire. Nipple heads are sunk flush with the Rims and covered to prevent injury to the inner tube.

WEIGHT. Approximately 92 pounds (not crated), approximately 125 pounds (crated), per set of four wheels complete. Cotter pins and a wrench for the spindle nuts are furnished with each set of wheels.

Rear Hubs



"MOTT" WIRE WHEELS

Increase riding pleasure and give greater tire mileage, protect the machine from vibratory stresses and minimize operating and maintenance expense.

These wheels are standardized and interchangeable and are sold ready for installation. Any owner can do this work with ordinary hand tools.

Every wheel is sold with a guarantee of entire satisfaction or refund of purchase price. Manufactured by a concern that is known throughout the industry for the character of work produced.

"Mott" Wire Wheels for Ford cars is the best investment that any Ford owner can make —It means more pleasure, more service, more comfort and the fullest degree of safety. Read specifications. Order today

MOTT WHEEL WORKS Wire Wheel Department **UTICA, N. Y.**

Directory of Touring Information

ATLANTA, GA.-CHICAGO, ILL.

Atlanta to	Route	Page	Miles
Louisville	100	67	670.5
Indianapolis	..	..	124.0
Chicago	153R	74	202.1

Total Mileage.....996.6

ATLANTA, GA.-NIAGARA FALLS, N. Y.

Atlanta to	Route	Page	Miles
Washington	100R	67	785.5
Pittsburg	100R	69	270.4
Buffalo	60	59	252.3
Niagara Falls	52R	52	21.6

Total Mileage.....1329.8

ATLANTA, GA.-WHITE MOUNTAINS, N. H.

Atlanta to	Route	Page	Miles
Washington	100R	67	785.5
Philadelphia	63	65	152.4
Springfield	61	62	270.7
Bethlehem	31R	34	217.1

Total Mileage.....1425.7

BOSTON, MASS.-CHICAGO, ILL.-SAN FRANCISCO, CAL.

Boston to	Route	Page	Miles
Albany	41R	39	188.8
Buffalo	52R	52	307.6
Chicago	151	71	580.0
San Francisco	1	6	2359.9

Total Mileage.....3436.3

BOSTON, MASS.-JACKSONVILLE, FLA.

Boston to	Route	Page	Miles
Springfield	41R	39	95.1
Stamford	61R	62	104.7
New York	11	17	33.7
Philadelphia	1	5	101.5
Washington	63R	66	152.4
Atlanta	100	66	785.5
Jacksonville	101	70	476.3

Total Mileage.....1749.2

BOSTON, MASS.-NEW ORLEANS, LA.

Boston to	Route	Page	Miles
New York	11	16	247.8
Pittsburg	1	5	400.3
Tusculum	100R	69	765.1
New Orleans	102	70	742.9

Total Mileage.....2155.1

BOSTON, MASS.-ST. JOHN, N. B.

Boston to	Route	Page	Miles
Portland	14	22	127.5

Bangor	11R	16	141.0
St. John	12R	20	223.4

Total Mileage.....491.9

BUFFALO, N. Y.-JACKSONVILLE, FLA.

Buffalo to	Route	Page	Miles
Philadelphia	60	59	381.6
Washington	63R	66	152.4
Atlanta	100	66	785.5
Jacksonville	101	70	476.3

Total Mileage.....1795.8

BUFFALO, N. Y.-NEWPORT, R. I.

Buffalo to	Route	Page	Miles
Albany	52	52	307.6
Worcester	41	38	144.7
Newport	23R	30	72.4

Total Mileage.....524.7

BUFFALO, N. Y.-SIOUX CITY, IA.

Buffalo to	Route	Page	Miles
Chicago	151	71	580.0
Sioux City	203	81	521.8

Total Mileage.....1101.8

BUFFALO, N. Y.-WHITE MOUNTAINS, N. H.-MOOSEHEAD LAKE, ME.

Buffalo to	Route	Page	Miles
Albany	52	52	307.6
Springfield	41	38	93.7
Bethlehem	31R	35	217.2
Rangeley	11	15	143.7
Moosehead Lake	14R	23	135.6

Total Mileage.....897.8

BURLINGTON, VT.-BOSTON, MASS.

Burlington to	Route	Page	Miles
Littleton	11	15	96.0
Plymouth	22	28	44.1
Boston	21	26	135.7

Total Mileage.....275.8

BURLINGTON, VT.-GETTYSBURG, PENN.-WASHINGTON, D. C.

Burlington to	Route	Page	Miles
Canaan	11R	15	202.7
Philadelphia	61	62	250.7
Gettysburg	1	5	118.5
Washington	63	66	77.7

Total Mileage.....649.6

CHICAGO, ILL.-ATLANTIC CITY, N. J.

Chicago to	Route	Page	Miles
Buffalo	151R	72	580.0
Elmira	60	59	154.6
Binghamton	..	..	63.5
Suffern	54R	56	161.0
Elizabeth	61R	62	44.0
Perth Amboy	..	..	13.1
Atlantic City	62	64	100.9

Total Mileage.....1119.1

CHICAGO, ILL.-BOSTON, MASS.

Chicago to	Route	Page	Miles
Buffalo	151R	72	580.0
Albany	52	52	307.6
Boston	41	38	188.8

Total Mileage.....1076.4

CHICAGO, ILL.-GALVESTON, TEX.

Chicago to	Route	Page	Miles
St. Louis	153R	75	333.8
Topeka	201	75	510.5
Galveston	206	88	1109.0

Total Mileage.....1853.6

CHICAGO, ILL.-NEW ORLEANS, LA.

Chicago to	Route	Page	Miles
St. Louis	153R	75	333.8
Forrest City	205	86	392.0
Memphis	202R	79	48.0
New Orleans	103	70	582.5

Total Mileage.....1356.3

CHICAGO, ILL.-WHITE MOUNTAINS, N. H.-MOOSEHEAD LAKE, ME.

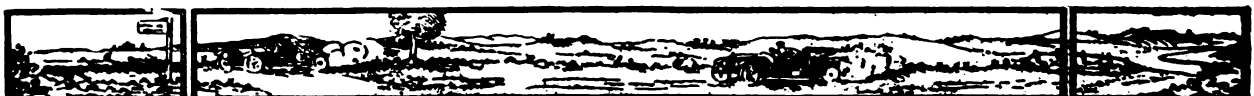
Chicago to	Route	Page	Miles
Buffalo	151R	72	580.0
Albany	52	52	307.6
Springfield	41	38	93.7
Bethlehem	31R	35	217.2
Rangeley	11	15	143.7
Moosehead Lake	14R	23	135.6

Total Mileage.....1477.8

CLEVELAND, O.-BOSTON, MASS.

Cleveland to	Route	Page	Miles
Buffalo	151R	72	191.9
Albany	52	52	307.6
Boston	41	38	188.8

Total Mileage.....688.3



Directory of Automobile Information

CLEVELAND, O.-GETTYSBURG, PENN.-WASHINGTON, D. C.

Cleveland to	Route	Page	Miles
Pittsburg	1R	6	128.9
Gettysburg	1R	6	180.1
Washington	63	66	77.7

Total Mileage.....386.7

CLEVELAND, O.-JACKSONVILLE, FLA.

Cleveland to	Route	Page	Miles
Pittsburg	1R	6	128.9
Washington	100	69	270.4
Atlanta	100	66	755.5
Jacksonville	101	70	476.3

Total Mileage.....1661.1

CLEVELAND, O.-WHITE MOUNTAINS, N. H.-ST. JOHN, N. B.

Cleveland to	Route	Page	Miles
Buffalo	151R	72	191.9
Albany	52	52	307.6
Springfield	41	38	93.7
Bethlehem	31R	35	217.2
Bangor	11	15	273.1
St. John	12R	20	223.4

Total Mileage.....1306.9

DENVER, COL.-ATLANTA, GA.-JACKSONVILLE, FLA.

Denver to	Route	Page	Miles
Colorado			
Spring	207	89	69.2
St. Louis	201R	77	969.3
Forrest City	205	86	392.0
Memphis	202R	79	48.0
Tusculumbia	102R	70	159.4
Atlanta	100R	68	329.3
Jacksonville	101	70	476.3

Total Mileage.....2378.7

DENVER, COL.-BOSTON, MASS.

Denver to	Route	Page	Miles
Colorado			
Spring	207	89	69.2
St. Louis	201R	77	969.3
Indianapolis	153R	75	243.5
Cincinnati	152R	74	124.0
Pittsburg	100	69	287.7
New York	1R	6	400.3
Boston	11R	17	247.8

Total Mileage.....2341.8

DENVER, COL.-BOSTON, MASS.-ST. JOHN, N. B.

Denver to	Route	Page	Miles
Chicago	1R	7	1132.1
Buffalo	151R	72	580.0
Albany	52	52	307.6
Boston	41	38	188.8

Portland	14	22	127.5
Bangor	11R	16	141.0
St. John	12R	20	223.4

Total Mileage.....2700.4

DENVER, COL.-WHITE MOUNTAINS, N. H.-MOOSEHEAD LAKE, ME.

Denver to	Route	Page	Miles
Chicago	1R	7	1132.1
Buffalo	151R	72	580.0
Albany	52	52	307.6
Springfield	41	38	93.7
Bethlehem	31R	35	217.2
Rangeley	11	15	143.7
Moosehead Lake	14R	23	135.6

Total Mileage.....2609.9

DETROIT, MICH.-BOSTON, MASS.

Detroit to	Route	Page	Miles
Buffalo	151	73	294.7
Albany	52	52	307.6
Boston	41	38	188.8

Total Mileage.....791.1

DETROIT, MICH.-BOSTON, MASS.

Detroit to	Route	Page	Miles
Toledo	152	73	58.4
Buffalo	151R	72	312.9
Albany	52	52	307.6
Boston	41	38	188.8

Total Mileage.....867.7

DETROIT, MICH.-GALVESTON, TEX.

Detroit to	Route	Page	Miles
Chicago	151R	73	314.3
St. Louis	153R	75	333.8
Topeka	201	75	510.8
Galveston	206	88	1109.0

Total Mileage.....2267.9

DETROIT, MICH.-GALVESTON, TEX.

Detroit to	Route	Page	Miles
Cincinnati	152	73	268.3
Tusculumbia	100R	69	376.4
Memphis	102	70	159.4
Fort Worth	202	79	619.7
Galveston	206	88	384.5

Total Mileage.....1808.3

DETROIT, MICH.-WASHINGTON, D. C.

Detroit to	Route	Page	Miles
Lima	152	73	138.2
Gettysburg	1R	8	432.5

Washington	63	66	77.7
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Total Mileage.....648.4

DETROIT, MICH.-NEW YORK.

Detroit to	Route	Page	Miles
Lima	152	73	138.2
New York	1R	8	651.7

Total Mileage.....789.9

DETROIT, MICH.-NEW YORK.

Detroit to	Route	Page	Miles
Buffalo	151	73	294.7
Albany	52	52	307.6
New York	50	44	157.7

Total Mileage.....760.0

DETROIT, MICH.-NEW YORK.

Detroit to	Route	Page	Miles
Buffalo	151	73	294.7
Elmira	60	59	154.6
Binghamton			63.5
Suffern	54R	56	161.0
Nanuet	61	62	8.3
New York	50	44	28.5

Total Mileage.....710.6

HARTFORD, CONN.-ADIRONDACKS, N. Y.

Hartford to	Route	Page	Miles
Canaan	61	62	47.2
Pittsfield	11	15	32.3
Lake Placid	51R	47	187.7

Total Mileage.....269.2

HARTFORD, CONN.-ATLANTIC CITY, N. J.

Hartford to	Route	Page	Miles
Elizabeth	61R	62	158.6
Perth Amboy			13.1
Atlantic City	62	64	100.9

Total Mileage.....272.6

HARTFORD, CONN.-KANSAS CITY, MO.

Hartford to	Route	Page	Miles
Philadelphia	61R	62	242.9
Pittsburg	1	5	298.8
Cincinnati	100R	69	287.7
Indianapolis	152	74	124.0
St. Louis	153	74	243.5
Kansas City	201	75	299.5

Total Mileage.....1486.4



Directory of Touring Information

INDIANAPOLIS, IND.-BOSTON, MASS.

Indianapolis to Route	Page	Miles
Cincinnati ....152R	74	124.0
Pittsburg .....100	69	287.7
New York 1R	6	400.3
Boston 11R	17	247.8
Total Mileage.....		1059.8

INDIANAPOLIS, IND.-BOSTON, MASS.

Indianapolis to Route	Page	Miles
South Bend.....152	74	136.0
Buffalo .....151R	72	479.9
Albany 52	52	307.6
Boston 41	38	188.8
Total Mileage.....		1112.3

KANSAS CITY, MO.-BOSTON, MASS.

Kansas City to Route	Page	Miles
St. Louis.....201R	77	299.5
Chicago .....153	75	433.8
Buffalo .....151R	72	580.0
Albany 52	52	307.6
Boston 41	38	188.8
Total Mileage.....		1799.7

KANSAS CITY, MO.-BOSTON, MASS.

Kansas City to Route	Page	Miles
St. Louis.....201R	77	299.5
Indianapolis ..153R	75	243.5
Cincinnati ....152R	74	124.0
Pittsburg .....100	69	287.7
New York 1R	6	400.3
Boston 11R	17	247.8
Total Mileage.....		1602.8

MINNEAPOLIS, MINN.-BOSTON, MASS.

Minneapolis to Route	Page	Miles
Chicago .....204R	84	492.8
Buffalo .....151R	72	580.0
Albany 52	52	307.6
Boston 41	38	188.8
Total Mileage.....		1569.2

MINNEAPOLIS, MINN.-WASHINGTON, D. C.

Minneapolis to Route	Page	Miles
Chicago .....204R	84	492.8
Gettysburg ... 1R	6	676.9
Washington .. 63	66	77.7
Total Mileage.....		1247.4

MONTREAL, QUE.-BOSTON, MASS.

Montreal to Route	Page	Miles
Newport 32	36	102.8
Littleton 31	34	62.0
Plymouth 22	28	44.1
Boston 21	26	135.7
Total Mileage.....		304.6

MONTREAL, QUE.-JACKSONVILLE, FLA.

Montreal to Route	Page	Miles
Albany 52R	51	281.7
New York 50	44	157.7
Philadelphia .. 1	5	101.5
Washington .. 63R	66	152.4
Atlanta .....100	66	785.5
Jacksonville ..101	70	476.3
Total Mileage.....		1955.1

MONTREAL-ST. JOHN, N. B.

Montreal to Route	Page	Miles
Quebec 32R	36	186.7
North Anson... ..		175.9
Bangor 11	16	64.1
St. John 12R	20	223.4
Total Mileage.....		650.1

MONTREAL-ST. JOHN, N. B.

Montreal to Route	Page	Miles
Newport 32	36	102.8
Bethlehem 31	34	67.0
Bangor 11	16	273.1
St. John 12R	20	223.4
Total Mileage.....		666.3

NEW HAVEN, CONN.-ATLANTA, GA.-JACKSONVILLE, FLA.

New Haven to Route	Page	Miles
New York..... 11	16	73.6
Philadelphia .. 1	5	101.5
Washington .. 63R	65	152.4
Atlanta .....100	66	785.5
Jacksonville ..101	70	476.3
Total Mileage.....		1609.3

NEW HAVEN, CONN.-MONTREAL, QUE.

New Haven to Route	Page	Miles
Springfield ... 61	62	64.8
White River Junction 31	34	132.2
Fanover		5.5
Littleton 31R	34	60.0
Newport 31R	34	62.0
Montreal 32	36	102.8
Total Mileage.....		427.9

NEW HAVEN, CONN.-GETTYSBURG-WASHINGTON, D. C.

New Haven to Route	Page	Miles
Philadelphia .. 61R	62	205.9
Gettysburg ... 1	5	118.7
Washington ... 63	66	77.7
Total Mileage.....		402.3

NEWPORT, R. I.-ADIRONDACKS, N. Y.

Newport to Route	Page	Miles
Worcester 23	30	72.4
Albany 41R	38	144.7
Cascade Lake.. 52	50	152.4
Total Mileage.....		369.5

NEWPORT, R. I.-JACKSONVILLE, FLA.

Newport to Route	Page	Miles
Ferry to Narragansett Pier.		
New York..... 11	16	170.7
Philadelphia .. 61R	62	96.9
Washington .. 63	66	152.4
Atlanta .....100	66	785.5
Jacksonville ..101	70	476.3
Total Mileage.....		1681.8

NEWPORT, R. I.-WHITE MOUNTAINS, N. H.

Newport to Route	Page	Miles
Providence ... 23	30	28.2
Boston 11R	16	45.5
Plymouth 21R	26	135.7
Littleton 22R	28	44.1
Bethlehem 11	15	5.0
Total Mileage.....		258.5

PHILADELPHIA, PENN.-ADIRONDACKS, N. Y.

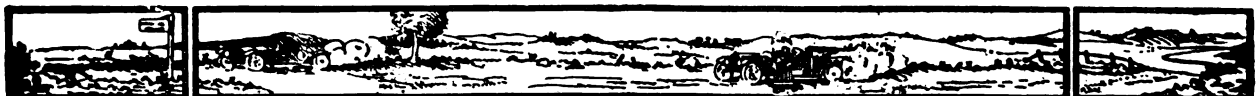
Philadelphia to Route	Page	Miles
Poughkeepsie .. 61R	62	198.9
Albany 50R	44	74.5
Cascade Lake.. 52	50	152.4
Total Mileage.....		425.8

PHILADELPHIA, PENN.-CHICAGO, ILL.

Philadelphia to Route	Page	Miles
Pittsburg 60	59	355.9
Cincinnati ....100R	69	287.7
Indianapolis ..152	74	130.1
Chicago .....153R	74	202.1
Total Mileage.....		975.8

PHILADELPHIA, PENN.-JACKSONVILLE, FLA.

Philadelphia to Route	Page	Miles
Washington .. 63	65	152.4



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Atlanta100 66 785.5
Jacksonville ..101 70 476.3

Total Mileage.....1414.2

PHILADELPHIA, PENN.-WHITE MOUNTAINS, N. H.

Philadelphia to Route Page Miles
Springfield 61 62 270.7
Bethlehem 31R 34 217.1

Total Mileage.....487.8

PORTLAND, ME.-JACKSONVILLE, FLA.

Portland to Route Page Miles
Boston 11 16 126.8
Springfield 41R 39 95.1
Philadelphia ... 61R 62 270.7
Washington 63R 66 152.4
Atlanta 100 66 785.5
Jacksonville .. 101 70 476.3

Total Mileage.....1906.8

PORTLAND, ME.-NIAGARA FALLS, N. Y.

Portland to Route Page Miles
Boston 11 16 126.8
Albany 41R 39 188.8
Niagara Falls.. 52R 52 329.2

Total Mileage.....644.8

PROVIDENCE, R. I.-ATLANTIC CITY, N. J.

Providence to Route Page Miles
New York 11R 16 202.3
Atlantic City.. 62 65 66.3

Total Mileage.....268.6

PROVIDENCE, R. I.-CHICAGO, ILL.

Providence to Route Page Miles
Worcester 23 30 44.2
Albany 41R 39 144.7
Buffalo 52R 52 307.6
Chicago 151 74 580.0

Total Mileage.....1076.5

PROVIDENCE, R. I.-GETTYSBURG-WASHINGTON, D. C.

Providence to Route Page Miles
Stamford 11 16 168.6
Philadelphia ... 61R 62 166.0
Gettysburg ... 1 5 118.7
Washington ... 63 66 77.7

Total Mileage.....531.0

PROVIDENCE, R. I.-JACKSONVILLE, FLA.

Providence to Route Page Miles
New York 11R 16 202.3
Philadelphia ... 62R 64 96.9
Washington 63R 65 152.4
Atlanta 100 66 785.5
Jacksonville .. 101 70 476.3

Total Mileage.....1713.4

PROVIDENCE, R. I.-MONTREAL, QUE.

Providence to Route Page Miles
Boston 11R 15 45.5
Plymouth 21R 26 135.7
Littleton 22R 28 44.1
Newport 31R 35 62.0
Montreal 32R 36 102.8

Total Mileage.....390.1

PROVIDENCE, R. I.-MONTREAL, QUE.

Providence to Route Page Miles
Worcester 23 30 44.2
Springfield 34R 39 51.0
Winooski 31 34 223.6
St. Pauls 60.6
Montreal 52 51 40.7

Total Mileage.....420.1

SPRINGFIELD, MASS.-ADIRONDACKS, N. Y.

Springfield to Route Page Miles
Albany 34R 38 93.7
Cascade Lake. 52 50 152.4

Total Mileage.....246.1

SPRINGFIELD, MASS.-ATLANTIC CITY, N. J.

Springfield to Route Page Miles
Stamford 61R 62 104.7
New York 11 17 33.7
Atlantic City.. 62 64 66.3

Total Mileage.....204.7

SPRINGFIELD, MASS.-GETTYSBURG-WASHINGTON, D. C.

Springfield to Route Page Miles
Philadelphia ... 61 63 323.9
Gettysburg ... 1 5 118.7
Washington ... 63 66 77.7

Total Mileage.....520.3

SPRINGFIELD, MASS.-JACKSONVILLE, FLA.

Springfield to Route Page Miles
Stamford 61R 62 104.7
New York 11 15 33.7

Philadelphia ... 62R 64 96.9
Washington ... 63R 65 152.4
Atlanta 100 66 785.5
Jacksonville .. 101 70 476.3

Total Mileage.....1649.5

SPRINGFIELD, MASS.-QUEBEC, QUE.

Springfield to Route Page Miles
Newport 31R 34 284.3
Quebec 32 36 177.8

Total Mileage.....462.0

SPRINGFIELD, MASS.-ST. JOHN, N. B.

Springfield to Route Page Miles
Boston 41 54 95.1
Bangor 11R 16 267.8
St. John 12R 20 223.4

Total Mileage.....586.3

WATERBURY, CONN.-ATLANTIC CITY, N. J.

Waterbury to Route Page Miles
New York 50R 43 88.3
Atlantic City.. 62 65 136.9

Total Mileage.....225.1

WATERBURY, CONN.-WHITE MOUNTAINS, N. H.

Waterbury to Route Page Miles
Brattleboro ... 50 43 116.0
White River Junction 31 34 66.0
Hanover 5.5
Bethlehem 31R 34 66.6

Total Mileage.....253.1

WORCESTER, MASS.-GETTYSBURG-WASHINGTON, D. C.

Worcester to Route Page Miles
Springfield ... 41R 39 51.0
Philadelphia ... 61R 62 270.7
Gettysburg ... 1 5 118.7
Washington ... 63 66 77.7

Total Mileage.....518.1

WORCESTER, MASS.-JACKSONVILLE, FLA.

Worcester to Route Page Miles
Springfield ... 41R 39 51.0
Stamford 61R 60 104.7
New York 11 17 33.5
Philadelphia ... 1 5 101.5
Washington ... 63R 66 152.4
Atlanta 100 66 785.5
Jacksonville .. 101 70 476.3

Total Mileage.....1705.1



DIGEST OF THE MOTORING LAWS NOW IN

State	Act of	Amended Registration	With Whom	Address	Fees	Driver	Chaufeur
Alabama	.....1911	.... Annual	Sec. of State	Montgomery	*\$7.50-\$20	..	\$5
Arizona	.....1912	.... Annual	Sec. of State	Phoenix	*\$5-\$10	..	\$5
Arkansas	.....1911	.... Annual	Sec. of State	Little Rock	\$5	..	\$1
California	.....1913	* Annual	Sec. of State	Sacramento	*\$5-\$30	\$1	\$2
Colorado	.....1913	.... Annual	Sec. of State	Denver	*\$2.50-\$10	..	\$1
Connecticut	.....1911	1913 Annual	Sec. of State	Hartford	50c hp.	\$2	\$2
Delaware	.....1909	1913 Annual	Sec. of State	Dover	\$5	*\$5	\$5
Florida	.....1911	.... *Perpetual	Sec. of State	Tallahassee	\$2	..	\$2
Georgia	.....1910	.... Perpetual	Sec. of State	Atlanta	\$2	..	..
Idaho	.....1913	.... Annual	Highway Com.	Boise	*\$15-\$40	..	..
Illinois	.....1911	* Annual	Sec. of State	Springfield	*\$4-\$10	..	\$5
Indiana	.....1913	.... Annual	Sec. of State	Indianapolis	*\$5-\$20	..	\$2
Iowa	.....1911	1913 Annual	Sec. of State	Des Moines	*	..	..
Kansas	.....1913	.... Annual	Sec. of State	Topeka	\$5	..	..
Kentucky	.....1910	.... Annual	Sec. of State	Frankfort	*\$5-\$20	..	..
Louisiana*******
Maine	.....1911	1913 Annual	Sec. of State	Augusta	*\$5-\$15	\$2	\$2
Maryland	.....1910	1912 Annual	Com. Mot. Veh.	Baltimore	*\$5-\$25	\$2	\$5
Massachusetts	.....1909	1912 Annual	Highway Com.	Boston	*\$5-\$25	\$2	\$2
Michigan	.....1909	* Annual	Sec. of State	Lansing	\$3	..	\$2
Minnesota	.....1911	.... Triennial	Sec. of State	St. Paul	\$1.50	..	\$3
Mississippi*******
Missouri	.....1909	1913 Annual	Sec. of State	Jefferson City	*\$2-\$12	..	\$1.50
Montana	.....1913	.... Perpetual	Sec. of State	Helena	\$2	..	\$2
Nebraska	.....1911	.... Annual	Sec. of State	Lincoln	\$2	..	..
Nevada	.....1913	.... Annual	Sec. of State	Carson City	12.5c hp.	..	..
New Hampshire	.....1911	1913 Annual	Sec. of State	Concord	*\$10-\$40	\$3	\$5
New Jersey	.....1906	1913 Annual	Com. Mot. Veh.	Trenton	*\$4.50-\$15	*	*
New Mexico	.....1913	.... Annual	Sec. of State	Santa Fe	*\$2-\$12	\$1	\$1
New York	.....1913	.... Annual	Sec. of State	Albany	*\$5-\$25	\$1	\$1
North Carolina	.....1913	.... Annual	Sec. of State	Raleigh	*\$5-\$10	..	..
North Dakota	.....1911	.... Annual	Sec. of State	Bismarck	\$3	..	..
Ohio	.....1911	.... Annual	Sec. of State	Columbus	\$5	..	\$2
Oklahoma	.....1911	.... Annual	Highway Com.	Oklahoma City	\$1	..	..
Oregon	.....1911	.... Annual	Sec. of State	Salem	*\$3-\$10	..	\$2
Pennsylvania	.....1910	*1911 Annual	Highway Dept.	Harrisburg	*\$5-\$15	\$2	\$2
Rhode Island	.....1909	1912 Annual	Bd. Pub. Roads.	Providence	*\$5-\$25	\$2	\$2
South Carolina	.....1906	.....	Clk. County Ct.	County seat	\$1	..	..
South Dakota	.....1913	.... Annual	Sec. of State	Pierre	\$6	..	..
Tennessee	.....1905	.... Perpetual	Sec. of State	Nashville	\$2	..	..
Texas	.....	.... Perpetual	County Clerk	County seat	50c	..	..
Utah	.....1909	1911 Perpetual	Sec. of State	Salt Lake City	\$2	..	\$2
Vermont	.....1908	1913 Annual	Sec. of State	Essex Junction	\$2 hp.	\$2	\$2
Virginia	.....1910	.... Annual	Sec. Com'wealth	Richmond	*\$5-\$20	..	\$2.50
Washington	.....1905	1913 Annual	Sec. of State	Olympia	\$2	..	..
West Virginia	.....1911	.... Perpetual	State Auditor	Wheeling	\$10	..	\$2
Wisconsin	.....1911	1913 Annual	Sec. of State	Madison	\$5	..	..
Wyoming	.....1913	.... Perpetual	Sec. of State	Cheyenne	\$5	..	..
District of Columbia	.....1906	1913 Perpetual	Automobile Bd.	Washington	\$2	\$2	\$2

*The following additional notations should be considered in connection with the above table: **Alabama**—Fees, 20hp, \$7.50; 20-30, \$12.50; 30-40, \$17.50; over 40, \$20. **Arizona**—Fees, 40 hp, \$5; over 40, \$10. **California**—Fees, 20 hp, \$5; 20-30, \$10; 30-40, \$15; 40-50, \$20; 50-60, \$25; over 60, \$30. **Colorado**—Fees, 20 hp, \$2.50; 21-40, \$5; over 40, \$10. **Delaware**—Family driving license, \$8. **Florida**—Special law provides for county registration; fees, 10 hp, \$5; 11-29, \$10; 30-40, \$20; 41-50, \$30; 51-60, \$50; 61-70, \$70; over 70, \$100. Two lamps are required from sunset to sunrise. **Idaho**—Fees, 30 hp, \$15; 30-40, \$20; 40-50, \$25; over 50, \$40. **Illinois**—Additional legislation pending. Fees, 25 hp, \$4; 25-35, \$6; 35-50, \$8; over 50, \$10. **Indiana**—Fees, 25 hp, \$5; 25-40, \$8; 40-50, \$15; over 50, \$20. **Iowa**—Fees, 20 hp, \$8; over 20, 40 cents a horsepower. **Kentucky**—Fees, 25 hp, \$5; 25-50, \$10;

over 50, \$20. **Louisiana**—State law pending. **Maine**—Fees, 20 hp, \$5; 20-35, \$10; over 35, \$15. Special provision for non-residents living within 15 miles of state line. **Maryland**—Fees, 10 hp, \$5; 10-20, \$10; 20-30, \$15; 30-40, \$20; over 40, \$25. Special license for two periods of seven days each for non-residents, except reciprocity by governor's proclamation with New York, Pennsylvania, Delaware, Virginia, West Virginia. **Massachusetts**—Fees, 20 hp, \$5; 20-30, \$10; 30-40, \$15; 40-50, \$20; over 50, \$20. **Michigan**—New law declared unconstitutional. **Mississippi**—Law has been declared unconstitutional by state supreme court. **Missouri**—Fees, 12 hp, \$2; 12-24, \$3; 24-36, \$5; 36-48, \$7; 48-60, \$8; 60-72, \$10; over 72, \$12. **New Hampshire**—Fees, 15 hp, \$10; 15-30, \$15; 30-40, \$20; 40-50, \$25; 50-60, \$30; over 60, \$40. Special provision for non-residents living within 15 miles of state line. **New Jersey**—Fees, 10 hp,

FORCE IN THE SEVERAL AMERICAN STATES.

Non-Residents	Lights	Front	Visible	Rear	Visible	Speed	Bus- Dis.	Res- Dis.	Out- side	Maxi- mum
reciprocity	30 mins.	2	.....	1	50 ft.	reasonable and proper	..	..	..	30
6 months	1 hour	2	.....	1	.....	reasonable and proper	10	15	30	..
exempt	1 hour	2	200 ft.	1	.....	reasonable and proper	15	15	20	..
exempt temp.	30 mins.	1	200 ft.	1	250 ft.	reasonable and proper	10	15	20	..
.....
exempt	30 mins.	2	200 ft.	1	.....	reasonable and proper	..	..	..	25
reciprocity	1 hour	1	200 ft.	1	.....	.....	12	12	20	..
30 days	.....	.....	.....	.....	.....	reasonable and proper	..	..	..	..
30 days	1 hour	1	100 ft.	1	.....	reasonable and proper	..	..	..	..
reciprocity	1 hour	2	200 ft.	1	100 ft.	careful and prudent	..	..	..	30
60 days	1 hour	2	200 ft.	1	150 ft.	reasonable and proper	10	15	20	25
reciprocity	30 mins.	2	200 ft.	1	100 ft.	reasonable and proper	10	15	20	25
reciprocity	30 mins.	2	500 ft.	1	50 ft.	careful and prudent	..	..	..	25
30 days	30 mins.	1	.....	1	50 ft.	reasonable and proper	12	12	20	..
exempt	1 hour	2	200 ft.	1	.....	reasonable and proper	10	15	20	..
.....
*30 days	30 mins.	2	.....	1	.....	reasonable, safe and proper	10	10	25	..
.....	1 hour	2	200 ft.	1	.....	reasonable and proper	12	12	18	25
10 days	30 mins.	2	200 ft.	1	60 ft.	reasonable and proper	10	15	20	..
exempt	1 hour	2	200 ft.	1	.....	reasonable and proper	10	15	25	..
30 days	1 hour	2	200 ft.	1	.....	reasonable and proper	15	15	25	..
.....
20 days	30 mins.	2	200 ft.	1	.....	careful and prudent	..	..	..	25
reciprocity	1 hour	2	200 ft.	1	.....	reasonable and proper	..	..	..	..
30 days	1 hour	1	.....	1	.....	reasonable and proper	12	12	25	..
30 days	1 hour	2	.....	1	.....	reasonable and proper	..	..	..	..
*10 days	30 mins.	2	200 ft.	1	50 ft.	reasonable and proper	15	15	25	..
*15 days	30 mins.	2	250 ft.	1	50 ft.	reasonable and proper	12	12	25	..
60 days	30 mins.	2	.....	1	.....	.....	..	..	..	..
reciprocity	30 mins.	2	200 ft.	1	50 ft.	careful and prudent	..	..	..	30
15 days	30 mins.	2	.....	1	50 ft.	reasonable and proper	10	15	25	..
exempt	.....	..	.....	..	.....	reasonable and proper	10	10	30	..
exempt	30 mins.	2	200 ft.	1	.....	reasonable and proper	15	20	25	..
not exempt	.....	..	.....	..	.....	.....	..	..	..	..
30 days	1 hour	2	200 ft.	1	50 ft.	reasonable and proper	..	..	..	25
10 days	1 hour	2	200 ft.	1	.....	reasonable and proper	..	..	..	24
10 days	1 hour	1	.....	1	.....	reasonable and proper	15	15	25	..
no provision	.....	..	.....	..	.....	.....	..	..	..	15
reciprocity	30 mins.	2	.....	1	.....	careful and prudent	10	10	25	..
no provision	.....	..	.....	..	.....	.....	8	8	18	..
no provision	.....	..	.....	..	.....	.....	..	..	..	30
exempt temp.	1 hour	2	.....	1	.....	reasonable and proper	10	15	20	..
reciprocity	45 mins.	2	200 ft.	1	50 ft.	.....	10	10	25	..
.....	1 hour	1	100 ft.	1	.....	.....	8	8	20	..
exempt	.....	1	.....	1	.....	reasonable and proper	12	12	24	..
reciprocity	1 hour	2	.....	1	.....	reasonable and proper	10	15	20	..
exempt	1 hour	1	.....	1	.....	reasonable and proper	15	15	25	..
.....
reciprocity	30 mins.	2	.....	1	.....	.....	.....	.....	.....	15

\$4.50; 11-29, \$7.50; over 29, \$15. Driver's and chauffeur's licenses, \$2 or \$4, according to the horsepower. Reciprocity governs non-resident provision. **New Mexico**—Fees, 12 hp, \$2; 12-20, \$4; 20-30, \$6; 30-40, \$8; 40-50, \$10; over 50, \$12. **New York**—Fees, 25 hp, \$5; 25-35, \$10; 35-50, \$15; over 50, \$25. **North Carolina**—25 hp, \$5; 25-40, \$7.50; over 40, \$10. **Oregon**—Fees, 26 hp, \$3; 26-36, \$5; 36-40, \$7.50; over 40, \$10. **Pennsylvania**—Fees, 20 hp, \$5; 20-50, \$10; over 50, \$15. **Rhode Island**—Fees, 5-20 hp, \$5; 20-30, \$10; 30-40, \$15; over 40, \$25. **Virginia**—Fees, 20 hp, \$5; 20-45, \$10; over 45, \$20. Non-residents are exempt for two periods of seven days each. **Washington**—Lights required during hours of darkness. **District of Columbia**—Ask for copy of police regulations covering speed limitations and streets on which automobiles are not permitted, as well as other special provisions.

The above table and the accompanying notations are held to present the essential features of the motoring laws in the various states as applying to tourists, although several of the states permit local ordinances and regulations. Practically all laws now provide for good and efficient brakes, suitable horn or other signalling device, and that the rear lamp shall display a red light toward the rear and a white light illuminating the number plate. Connecticut, Maryland, Massachusetts, Minnesota, New Hampshire, New Jersey, Pennsylvania, Rhode Island, Vermont and Washington forbid the use of the muffler cut-out. Tire chains are not permitted on certain surfaces, unless the roads are in a slippery condition, in Delaware, Michigan and New Jersey, while Montana expressly requires their use when the road surface is in an unsafe condition.

Eighth Annual Touring Number.

CONFIDENT that it will meet every possible requirement of the touring motorist in America, The Automobile Journal presents this, its EIGHTH ANNUAL TOURING NUMBER, as the most complete routing guide and reference book ever published.

Eight years ago it was considered quite sufficient to provide routing directions for a small portion of the New England States. Little touring was undertaken elsewhere in America. Each season the routing information has been revised and amplified until this present number covers every state in the Union and enters Canada at eight different points.

The itineraries in this Eighth Annual Touring Number cover more than 40,000 miles of the best roads in America, and these highways would occupy the time of a motorist for exactly one year if followed precisely as laid out herein. The endless number of combinations possible, since each tour has been prepared with the view of connecting with all others, thus enabling the motorist to start from any one point and reach any other section of the country, supply routing data sufficient for a lifetime of touring.

The information relative to the various sections of the country covered in previous numbers has been very carefully revised and brought up-to-date, and many new tours have been added, while itineraries embracing nearly 4000 miles—3999.1, to be exact—are presented here for the first time in any publication. The Automobile Journal not only was a pioneer in supplying its readers with authentic touring information, but it continues to be the first to enter districts heretofore deemed impracticable for the motor car.

Particular attention is directed to the various transcontinental tours, since it is anticipated that many eastern motorists will desire to make the trip to the Panama-Pacific exposition of 1915 in their machines. In the preceding pages may be found some suggestions for combining the itineraries listed so as to make it possible to reach any section desired. Eight different transcontinental journeys are indicated there, but the list of combinations covering this subject is by no means exhausted at that point.

While too much emphasis cannot be laid upon the value of routing directions, and the method followed in presenting them, there are other features of almost, if not quite, equal importance. Considerable space has been devoted herein to the presentation of mechanical articles on subjects of vital interest to the touring motorist. They have been prepared with a view to affording exactly the advice required, when it is needed the most. With the possession of a modern car and the information contained in these discussions no motorist should hesitate to undertake a long distance tour of substantial proportions.

It would be impossible to overlook the splendid illustrations with which this number is so plentifully supplied. The Automobile Journal is indebted to a large number of parties for courtesies extended. So far as possible an attempt has been made to give credit in each instance, but a list of those who have rendered valuable assistance in this and other respects would include the leading railroad companies of this country and Canada, the boards of trade and chambers of commerce in practically all of the cities of the West and Pacific Coast, many automobile clubs and individuals.

THE EDITOR.

AUTOMOBILE & JOURNAL

EIGHTH
ANNUAL
TOURING
NUMBER

VOL. XXXVII
NO. 11



JULY
10th
1914

RAYFIELD

CARBURETORS

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No matter what the car—

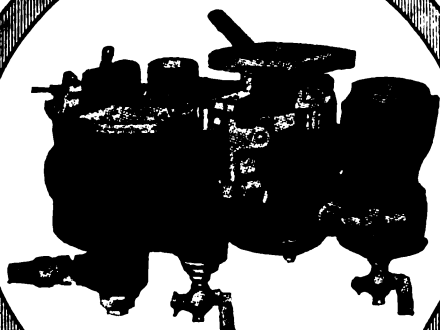
No matter what carburetor now on it—

We will absolutely guarantee, on a money-back basis, that the Rayfield will show a consistently better performance than the carburetor now being used.

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FOLLOWING THE LINCOLN HIGHWAY.

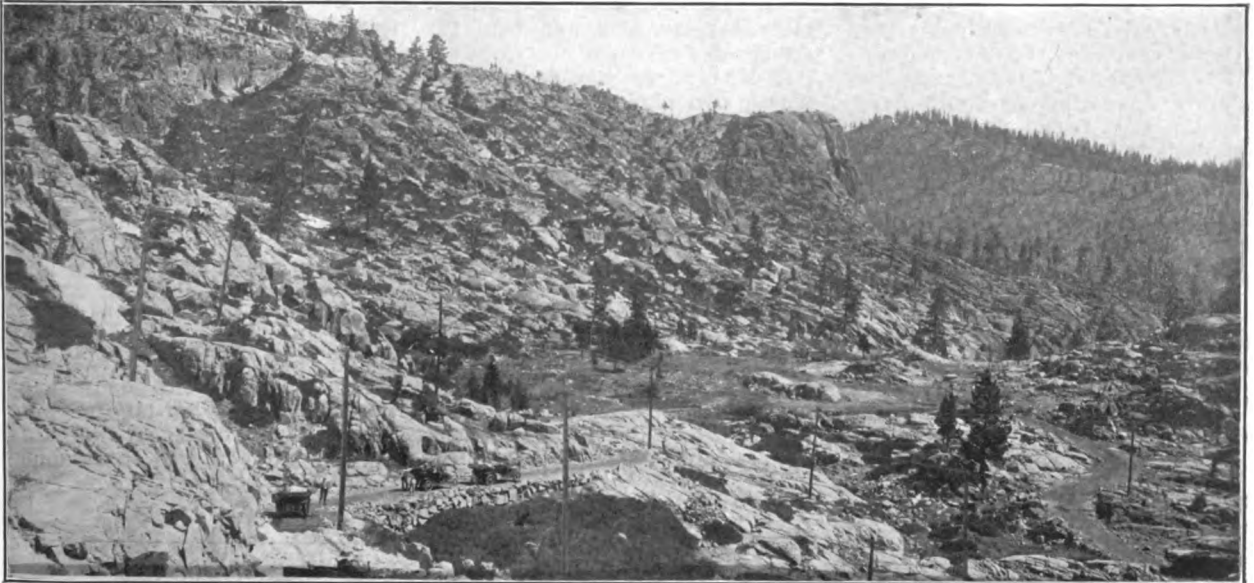
Detailed Itinerary of the Route from New York City to San Francisco Which Eventually Will Be Surfaced Throughout with Concrete.

SHORTLY after the Seventh Annual Touring Number of The Automobile Journal made its appearance, the Lincoln Highway Association made public the route over which it contemplates the expenditure of some \$10,000,000 in the construction of a concrete roadway from New York City to San Francisco. In this Eighth Annual Touring Number The Automobile Journal offers a detailed itinerary of the Lincoln highway, this being the first time

Elsewhere in this issue will be found detailed itineraries which may be used in combination with each other and with this route, to afford every opportunity to make a transcontinental journey meeting with the desires of the individual tourist. However, from the fact that a large number of motorists are contributors to the Lincoln Highway Association, and that the proposition has received extensive publicity among motor car owners and users, it is anti-

miles to Philadelphia at the south, before starting westward, although The Automobile Journal has furnished an itinerary leading across the state almost directly westward to Buffalo. The Albany-Buffalo-Chicago route undoubtedly will be retained by New England tourists until such time as the concrete roadway is completed, there being a difference of 65.5 miles in its favor, with Boston as the starting point.

The road from New York City



Where the Lincoln Highway Enters the Rocky Mountain District—Beginning the Winding Ascent of the Emigrant Gap Route.

the route has been presented in this manner.

The route announced by the Lincoln Highway Association is subject to some slight changes here and there as future conditions shall deem necessary. However, it is the intention of those in charge of this work to secure, as far as possible, the co-operation of state, county and municipal authorities in working out the original plan, so that the main points from coast to coast will undoubtedly remain unchanged as the work progresses.

pated that by far the majority of transcontinental tourists will select this route, albeit some time must necessarily elapse before the concrete surfacing is completed from the Atlantic to the Pacific.

The most direct route from New York City westward would lie across the southern portion of New York State to the northeastern corner of Pennsylvania. Certain topographical conditions make this impractical, and it has been deemed necessary to make a detour, either some 150 miles to Albany at the north, or some 100

across New Jersey to Philadelphia is a portion of the trunk line to Washington and the South. The Philadelphia-Gettysburg section is almost as well known. Thence the way leads over the mountains to Pittsburg, and until very recently this portion was a serious argument against the selection of this route, but state highway work planned and in progress will eliminate all objection on this score.

After leaving Pittsburg the Lincoln highway enters Ohio, crossing that commonwealth over state



Pleasant Combination of River and Mountain Views, Characteristic of Eastern Pennsylvania.

roads, some of which already have been concreted for some years. The Albany-Buffalo-Chicago itinerary is reached at South Bend, Ind., and from that point to Julesburg, Col., the so-called northern transcontinental route becomes the Lincoln highway. This condition virtually exists to Salt Lake City, although the plans permit of a detour between Julesburg and Cheyenne, visiting Denver.

From Salt Lake City the Lincoln highway is made to coincide with work recently undertaken by the State of Utah, following the so-called Midland trail on the line of the Pikes Peak transcontinent-

al route across Colorado, from St. Louis and Kansas City. This trail leads across Nevada to Reno, where two choices of route are permitted, each visiting the wonderful Lake Tahoe country.

It will be noted that a greater portion of this route lies over ways that have been utilized for a number of years by transcontinental tourists, and therefore may be expected to meet with every indorsement from the motoring public. The section between Pittsburg and Chicago is receiving much attention from the highway authorities this year, large sums having been voted by the citizens to carry out the plan as suggested.

That portion between Salt Lake City and Reno, or Austin, Nev., probably offers the greatest difficulty of the entire trip, since much of the way is over desert land. It is believed, however, that this route, when completed, will offer particular advantages over the circuitous one around the northern shores of Great Salt lake.

It should be added that, of course, the object of the association has not been solely that of providing an ideal transcontinental route for motorists, although this is believed to have been accomplished, but to provide a great natural artery of traffic serving the greatest number of people. Careful study of the map will reveal that the Lincoln highway reaches the more important centres of the country, and, therefore, more population, and the several itineraries presented in this number will indicate that it has many lateral connecting roads leading to points of interest.

While the work of charting this route has been under way for less than a year, large portions of it have been marked by the official, copyrighted sign of the association. This is 21 inches high, painted on posts, etc., and consists of a strip of red three inches wide at the top, a band of white 15 inches wide and a strip of blue at the bottom three inches in width. On the white band appears the letter "L" and the words "Lincoln Highway". Transcontinental motorists should have no difficulty in following the route from coast to coast by watching for and attending to these signs.



ITINERARY NO. 1.

Night Stops—New York City, Philadelphia, Gettysburg, Bedford and Pittsburg, Penn.; Canton and Lima, O.; South Bend, Ind.; Chicago, Ill.; Clinton and Marshalltown, Ia.; Omaha and Kearney, Neb.; Julesburg and Denver, Col.; Cheyenne, Rawlins and Green River, Wyo.; Salt Lake City and Kearney's Ranch, Utah; Ely, Austin and Reno, Nev.; Sacramento and San Francisco, Cal. Twenty-Four Days, 3174.7 Miles.



In the Valley of the Truckee River, Near the Nevada-California Boundary Line, on the Way to Lake Tahoe.

New York-Philadelphia, 101.5 Miles.

Ferry to Jersey City, N. J.

	Miles to	Total Miles	Out Return
Jersey City.....	0.0	0.0	101.5
Newark.....	10.1	10.1	91.4
West Elizabeth..	4.2	14.3	87.2
Elizabeth.....	2.0	16.3	85.2
Iselin.....	10.9	27.2	74.3
Metuchen.....	2.1	29.3	72.2
New Brunswick..	5.5	34.8	66.7
Franklin Park..	6.2	41.0	60.5
Kingston.....	6.8	47.8	53.7
Princeton.....	3.0	50.8	50.7
Lawrenceville..	5.1	55.9	45.6
Trenton.....	5.9	61.8	39.7
White Horse....	4.1	65.9	35.6
Bordentown.....	3.1	69.0	32.5
Columbus.....	5.4	74.4	27.1
Burlington.....	7.5	81.9	19.6
Bridgeboro.....	5.2	87.1	14.4
Cinnaminson....	3.9	91.0	10.5
Camden.....	8.5	99.5	2.0
Philadelphia....	2.0	101.5	0.0

Philadelphia-Gettysburg, 118.7 Miles.

	Miles to	Total Miles	Out Return
Philadelphia.....	0.0	0.0	118.7
Ardmore.....	9.4	9.4	109.3
Bryn Mawr.....	2.1	11.5	107.2
Wayne.....	3.9	15.4	103.3
Devon.....	1.5	16.9	101.8
Berwyn.....	1.4	18.3	100.4
Dalesford.....	1.2	19.5	99.2
Paoli.....	1.2	20.7	98.0
Malvern.....	1.5	22.2	96.5
Whitford.....	7.4	29.6	89.1
Downington....	3.3	32.9	85.8
Coatesville.....	6.6	39.5	79.2
Ladsburyville..	3.9	43.4	75.3
Strasburg.....	10.2	53.6	65.1
Paradise.....	2.7	56.3	62.4
Lancaster.....	9.6	65.9	52.8
Columbia.....	10.2	76.1	42.6
Wrightsville....	1.9	78.0	40.7
York.....	11.8	89.8	28.9
Thomasville....	7.1	96.9	21.8
Abbotstown....	7.7	104.6	14.1

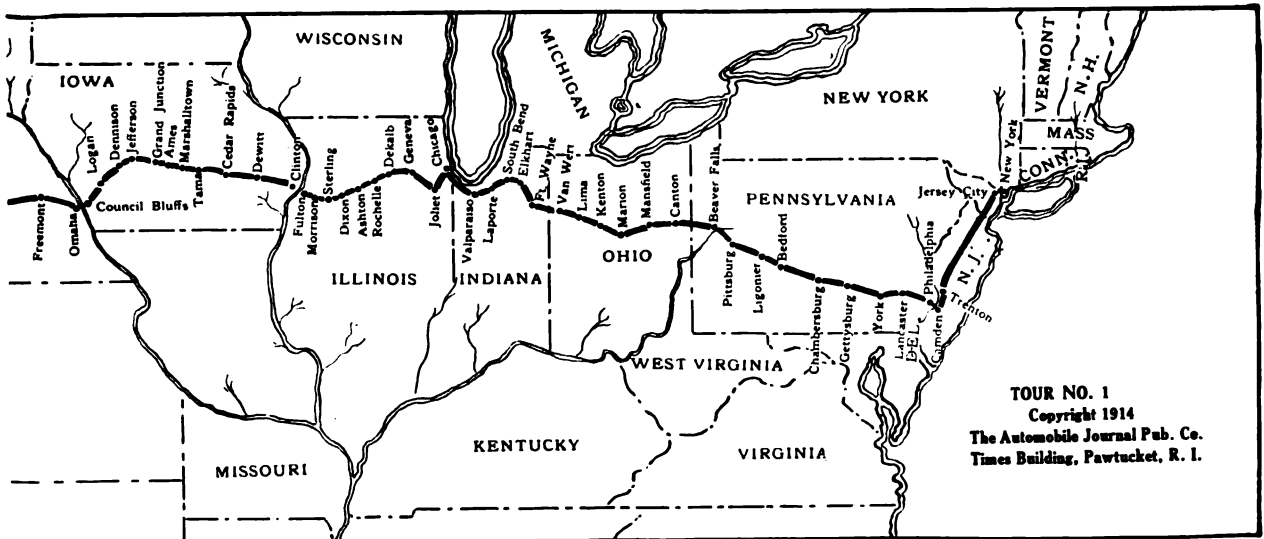
New Oxford.....	4.2	108.8	9.9
Gettysburg.....	9.9	118.7	0.0

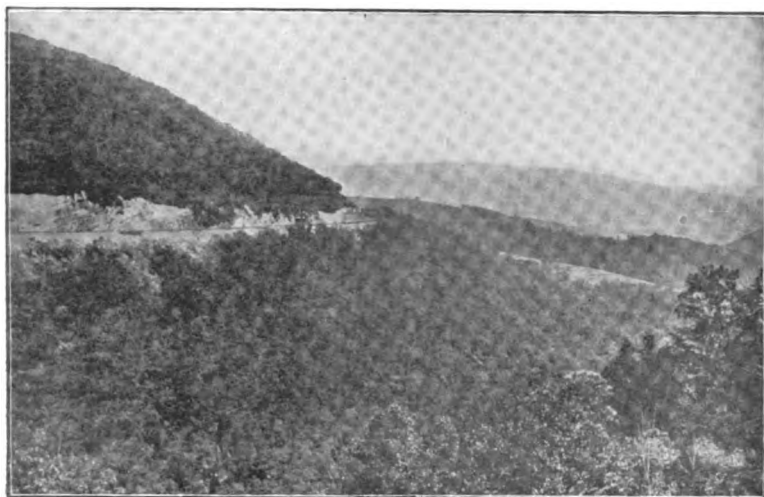
Gettysburg-Bedford, 80.1 Miles.

	Miles to	Total Miles	Out Return
Gettysburg.....	0.0	0.0	80.1
Seven Stars.....	3.9	3.9	76.2
McKnightstown..	1.9	5.8	74.3
Cashtown.....	1.9	7.7	72.4
Fayetteville....	11.4	19.1	61.0
Chambersburg...	5.5	24.6	55.5
St. Thomas.....	7.4	32.0	48.1
Fort London....	6.0	38.0	42.1
McConnellsburg..	8.1	46.1	34.0
Harrisonville...	6.4	52.5	27.6
Breezewood.....	11.4	63.9	16.2
Everett.....	8.4	72.3	7.8
Mt. Dallas.....	1.1	73.4	6.7
Bedford.....	6.7	80.1	0.0

Bedford-Pittsburg, 100 Miles.

	Miles to	Total Miles	Out Return
Bedford.....	0.0	0.0	100.0





The Allegheny Mountains of Pennsylvania Present Magnificent Views.

Wolfsburg	2.5	2.5	97.5
Schellsburg	6.9	9.4	90.6
Buckstown	13.5	22.9	77.1
Stoyestown	2.0	24.9	75.1
Jenners	10.7	35.6	64.4
Jennerstown	1.0	36.6	63.4
Laughlinstown	8.8	45.4	54.6
Ligonier	3.0	48.4	51.6
Youngstown	9.1	57.5	42.5
Greensburg	10.0	67.5	32.5
Grapeville	4.1	71.6	28.4
Adamsburg	2.3	73.9	26.1
Irwin	3.0	76.9	23.1
Jacksonville	1.2	78.1	21.9
Circleville	0.6	78.7	21.3
E. McKeesport	5.8	84.5	15.5
Wilmerding	1.5	86.0	14.0
Wilkinsburg	6.7	92.7	7.3
Pittsburg	7.3	100.0	0.0

Pittsburg-Canton, 97.9 Miles.

	Miles to	Total Miles	Out Return
Pittsburg	0.0	0.0	97.9
Sewickley	13.5	13.5	84.4
Ambridge	4.2	17.7	80.2
Economy	1.0	18.7	79.2
Freedom	7.0	25.7	72.2
Rochester	2.0	27.7	70.2
New Brighton	3.0	30.7	67.2
Beaver Falls	1.5	32.2	65.7
Darlington	8.2	40.4	57.5
Unity, O.	8.7	49.1	48.8
Columbiana	7.6	56.7	41.2
Washingtonville	4.2	60.9	37.0
Salem	5.1	66.0	31.9
Damascus	5.5	71.5	26.4
Alliance	8.1	79.6	18.3
Harrisburg	6.8	86.4	11.5
Louisville	4.5	90.9	7.0
Canton	7.0	97.9	0.0

Canton-Lima, 153.5 Miles.

	Miles to	Total Miles	Out Return
Canton	0.0	0.0	153.5
Massillon	8.0	8.0	145.5
Brookfield	2.3	10.3	143.2
Greenville	3.0	13.3	140.2
Dalton	3.9	17.2	136.3
East Union	6.3	23.5	130.0
Wooster	6.6	30.1	123.4
Jefferson	4.4	34.5	119.0
Reedsburg	4.5	39.0	114.5
Jeromesville	4.7	43.7	109.8
Hayesville	4.5	48.2	105.3
Mifflin	5.5	53.7	99.8

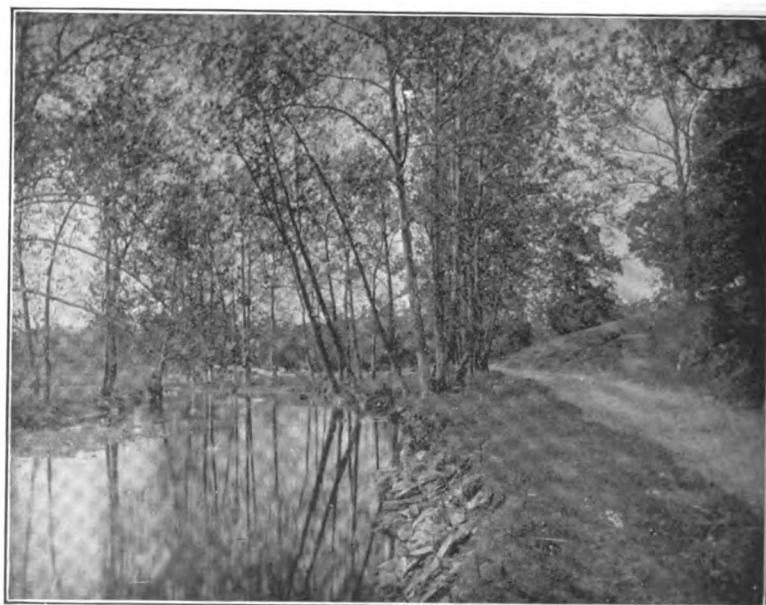
Noblesville	7.3	85.2	59.1
Wolf Lake	4.5	89.7	54.6
Kimmell	5.0	94.7	49.6
Ligonier	5.5	100.2	44.1
Millersburg	9.2	109.4	34.9
Goshen	9.4	118.8	25.5
Dunlap	4.7	123.5	20.8
Elkhart	5.5	129.0	15.3
Osceola	6.0	135.0	9.3
Mishawaka	5.3	140.3	4.0
South Bend	4.0	144.3	0.0

South Bend-Chicago, 101.1 Miles.

	Miles to	Total Miles	Out Return
South Bend	0.0	0.0	101.1
New Carlisle	13.6	13.6	87.5
La Porte	12.3	25.9	75.2
Pinhook	8.4	34.3	66.8
Westville	2.7	37.0	64.1
Valparaiso	10.3	47.3	53.8
Wheeler	7.5	54.8	46.3
Hobart	5.2	60.0	41.1
Gary	4.0	64.0	37.1
Highlands	7.4	71.4	29.7
Hessville	2.2	73.6	27.5
Gibson	1.1	74.7	26.4
Grasselli	1.0	75.7	25.4
Calumet	0.9	76.6	24.5
East Chicago	1.1	77.7	23.4
Whiting	3.0	80.7	20.4
South Chicago	5.3	86.0	15.1
Bryn Mawr	3.0	89.0	12.1
Chicago	12.1	101.1	0.0

Chicago-Clinton, 147.5 Miles.

	Miles to	Total Miles	Out Return
Chicago	0.0	0.0	147.5
Austin	7.9	7.9	139.6
Oak Park	3.4	11.3	136.3
Maywood	0.8	12.1	135.4
Elmhurst	5.3	17.4	130.1
Lombard	4.1	21.5	126.0
West Chicago	9.1	30.6	116.9
Geneva	5.5	36.1	111.4
Elburn	8.4	44.5	103.0
De Kalb	15.8	60.3	87.2
Creston	11.2	71.5	76.0
Rockelle	6.1	77.6	69.9
Ashton	12.0	89.6	57.9



Along the Pennypack River in Southern Pennsylvania.

Franklin Groves.	4.6	94.2	53.3
Dixon	9.7	103.9	43.6
Sterling	14.4	118.3	29.2
Emerson	3.6	121.9	25.6
Morrison	10.7	132.6	14.9
Union Grove	3.7	136.3	11.2
Fulton	7.6	143.9	3.6
Lyons, Ia.	1.3	145.2	2.3
Clinton	2.3	147.5	0.0

Clinton-Marshalltown, 167.4 Miles.

	Miles to	Total Miles	Out Return
Clinton	0.0	0.0	167.4
Elvira	9.5	9.5	157.9
De Witt	11.6	21.1	146.3
Grand Mount	5.7	26.8	140.6
Wheatland	10.3	37.1	130.3
Lowden	6.2	43.3	124.1
Clarence	8.5	51.8	115.6
Mechanicville	10.8	62.6	104.8
Liabon	7.0	69.6	97.8
Mt. Vernon	1.8	71.4	96.0
Marion	13.2	84.6	82.8
Cedar Rapids	5.8	90.4	77.0
Belle Plains	36.5	126.9	40.5
Chelsen	6.5	133.4	34.0
Tama	11.5	144.9	22.5
Montour	8.5	153.4	14.0
Marshalltown	14.0	167.4	0.0

Marshalltown-O m a h a, 219.3 Miles.

	Miles to	Total Miles	Out Return
Marshalltown	0.0	0.0	219.3
State Center	14.5	14.5	204.8
Colo	8.8	23.3	196.0
Nevada	7.3	30.6	188.7
Ames	8.1	38.7	180.6
Jordan	10.6	49.3	170.0
Boone	5.6	54.9	164.4
Ogden	10.3	65.2	154.1
Beaver	6.4	71.6	147.7
Grand Junction	4.6	76.2	143.1
Jefferson	7.9	84.1	135.2
Seranton	10.0	94.1	125.2
Balston	6.7	100.8	118.5
Glidden	5.0	105.8	113.5
Carroll	7.5	113.3	106.0
West Side	12.6	125.9	93.4
Vall	5.9	131.8	87.5
Denison	9.1	140.9	78.4
Arion	8.5	149.4	69.9
Dow City	2.5	151.9	67.4
Dunlap	8.6	160.5	58.8
Woodbine	11.8	172.1	47.2
Logan	10.1	182.2	37.1
Missouri Valley	9.7	191.9	27.4
Loveland	4.7	196.6	22.7
Crescent	10.4	207.0	12.3
Council Bluffs	7.9	214.9	4.4
Omaha, Neb.	4.4	219.3	0.0

Omaha-Kearney, 196.5 Miles.

	Miles to	Total Miles	Out Return
Omaha	0.0	0.0	196.5
Milkhorn	17.1	17.1	179.4
Waterloo	3.2	20.3	176.2
Fremont	17.2	37.5	159.0
Ames	8.3	45.8	150.7
North Bend	8.2	54.0	142.5
Rogers	7.2	61.2	135.3
Schuyler	8.2	69.4	127.1
Benton	8.9	78.3	118.2
Columbus	7.6	85.9	110.6
Duncan	8.7	94.6	101.9
Silver Creek	8.3	102.9	93.6
Ravens	5.7	108.6	87.9
Clarks	5.5	114.1	82.4
Central City	12.9	127.0	69.5
Chapman	5.8	132.8	63.7
Grand Island	17.3	150.1	46.4

Alda	8.0	158.1	38.4
Wood River	10.0	168.1	28.4
Shelton	8.5	176.6	19.9
Gibbon	6.2	182.8	13.7
Buda	8.5	191.3	5.2
Kearney	5.2	196.5	0.0

Kearney-Julesburg, 196.5 Miles.

	Miles to	Total Miles	Out Return
Kearney	0.0	0.0	196.5
Odesa	9.6	9.6	186.9
Elm Creek	7.0	16.6	179.9
Overton	9.9	26.5	170.0
Lexington	10.3	36.8	159.7
Cozad	18.3	55.1	141.4
Willow Island	5.1	60.2	136.3
Gothenburg	7.8	68.0	128.5
Brady Island	13.3	81.3	115.2
Maxwell	9.4	90.7	105.8
North Platte	15.6	106.3	90.2
Hershy	13.6	119.9	76.6
Sutherland	6.6	126.5	70.0
Paxton	12.2	138.7	57.8
Korty	6.8	145.5	51.0
Roscoe	6.1	151.6	44.9

Longmont	12.8	35.3	77.7
Berthoud	11.9	47.2	65.8
Loveland	7.3	54.5	58.5
Fort Collins	13.0	67.5	45.5
Wellington	11.7	79.2	33.8
Cheyenne, Wyo.	33.8	113.0	0.0

Cheyenne-Rawlins, 195.5 Miles.

	Miles to	Total Miles	Out Return
Cheyenne	0.0	0.0	195.5
Borie	9.5	9.5	186.0
Otto	5.0	14.5	181.0
Granite Canyon	4.7	19.2	176.3
Buford	8.1	27.3	168.2
Laramie	31.3	58.6	136.9
Medicine Bow	74.0	132.6	62.9
Carbon	9.4	142.0	53.5
Hanna	13.0	155.0	40.5
Fort Steele	25.6	180.6	14.9
Greenville	7.9	188.5	7.0
Rawlins	7.0	195.5	0.0

Rawlins-Green River, 157.5 Miles.

	Miles to	Total Miles	Out Return
Rawlins	0.0	0.0	157.5



Typical Scene in the Great American Desert in Nevada.

Ogallala	7.3	158.9	37.6
Brule	11.0	169.9	26.6
Julesburg, Col.	26.6	196.5	0.0

*Julesburg-Denver, 204.9 Miles.

	Miles to	Total Miles	Out Return
Julesburg	0.0	0.0	204.9
Ovid	8.3	8.3	196.6
Sedgwick	8.2	16.5	188.4
Red Lion	10.5	27.0	177.9
Crook	6.9	33.9	171.0
Proctor	8.3	42.2	162.7
Iliff	7.4	49.6	155.3
Sterling	12.3	61.9	143.0
Atwood	6.5	68.4	136.5
Merino	6.0	74.4	130.5
Hillrose	19.2	93.6	111.3
Brush	9.7	103.3	101.6
Fort Morgan	9.5	112.8	92.1
Morville	35.5	148.3	56.6
Bennett	24.8	173.1	31.8
Watkins	9.5	182.6	22.3
Sable	12.3	194.9	10.0
Denver	10.0	204.9	0.0

Denver-Cheyenne, 113 Miles.

	Miles to	Total Miles	Out Return
Denver	0.0	0.0	113.0
Broomfield	16.5	16.5	96.5
Lafayette	6.0	22.5	90.5

Latham	30.0	30.0	127.5
Wamsutter	10.0	40.0	117.5
Red Desert	8.5	48.5	109.0
Tipton	8.0	56.5	101.0
Monell	12.0	68.5	89.0
Bitter Creek	25.0	93.5	64.0
Black Buttes	10.0	103.5	54.0
Mallville	6.0	109.5	48.0
Point of Rocks	6.0	115.5	42.0
Rock Springs	26.0	141.5	16.0
Green River	16.0	157.5	0.0

Green River-Salt Lake City, 190.1 Miles.

	Miles to	Total Miles	Out Return
Green River	0.0	0.0	190.1
Bryan	13.7	13.7	176.4
Granger	20.9	34.6	155.5
Liman	29.1	63.7	126.4
Fort Bridger	5.7	69.4	120.7
Dog Springs	10.4	79.8	110.3
Spring Valley	7.1	86.9	103.2
Evanston	18.7	105.6	84.5
Wahatch, Utah	10.2	115.8	74.3
Castle Rock	7.1	122.9	67.2
Emery	7.9	130.8	59.3
Coalville	14.6	145.4	44.7
Wanship	13.2	158.6	31.5
Gorgosa	9.1	167.7	22.4



California State Road Cut on a Granite Shelf in the Lake Tahoe Country.

Dale	10.3	178.0	12.1
Salt Lake City..	12.1	190.1	0.0
Salt Lake City-Kearney's Ranch, 145 Miles.			

	Miles to	Total Miles	
	Out	Return	
Salt Lake City..	0.0	0.0	145.0
Garfield	19.0	19.0	126.0
Grantsville	9.0	28.0	117.0
Temple	7.0	35.0	110.0
Josepa	10.0	45.0	100.0
Palmera	9.0	54.0	91.0
Paula	6.0	60.0	85.0
Bullionville	45.0	105.0	40.0
Fish Spring	20.0	125.0	20.0
Kearney's Ranch	20.0	145.0	0.0

Kearney's Ranch-Ely, 125 Miles.

	Miles to	Total Miles	
	Out	Return	
Kearney's Ranch	0.0	0.0	125.0
Ihapah	36.5	36.5	88.5
Tippett, Nev.....	15.0	51.5	73.5
Shelbourne	18.5	70.0	55.0

Kent	30.0	100.0	25.0
McGill	12.3	112.3	12.7
Ely	12.7	125.0	0.0

Ely-Austin, 147 Miles.

	Miles to	Total Miles	
	Out	Return	
Ely	0.0	0.0	147.0
Lane City	2.5	2.5	144.5
Rilepetown	8.0	10.5	136.5
Kimberly	1.0	11.5	135.5
Moorman's	21.0	32.5	114.5
Rosevear's	2.5	35.0	112.0
White Pine.....	6.0	41.0	106.0
Pancake	14.0	55.0	92.0
Eureka	22.0	77.0	70.0
Austin	70.0	147.0	0.0

Austin-Reno, 183.5 Miles.

	Miles to	Total Miles	
	Out	Return	
Austin	0.0	0.0	183.5
Alpine Ranch	47.5	47.5	136.0
Eastgate	12.5	60.0	123.5
Westgate	20.0	80.0	103.5
Sand Springs.....	10.0	90.0	93.5
Fallon	27.0	117.0	66.5

Leetville	8.0	125.0	58.5
Hasen	8.5	133.5	50.0
Fernley	12.5	146.0	37.5
Wadsworth	3.5	149.5	34.0
Sparks	30.0	179.5	4.0
Reno	4.0	183.5	0.0

†Reno-Sacramento, 152.7 Miles.

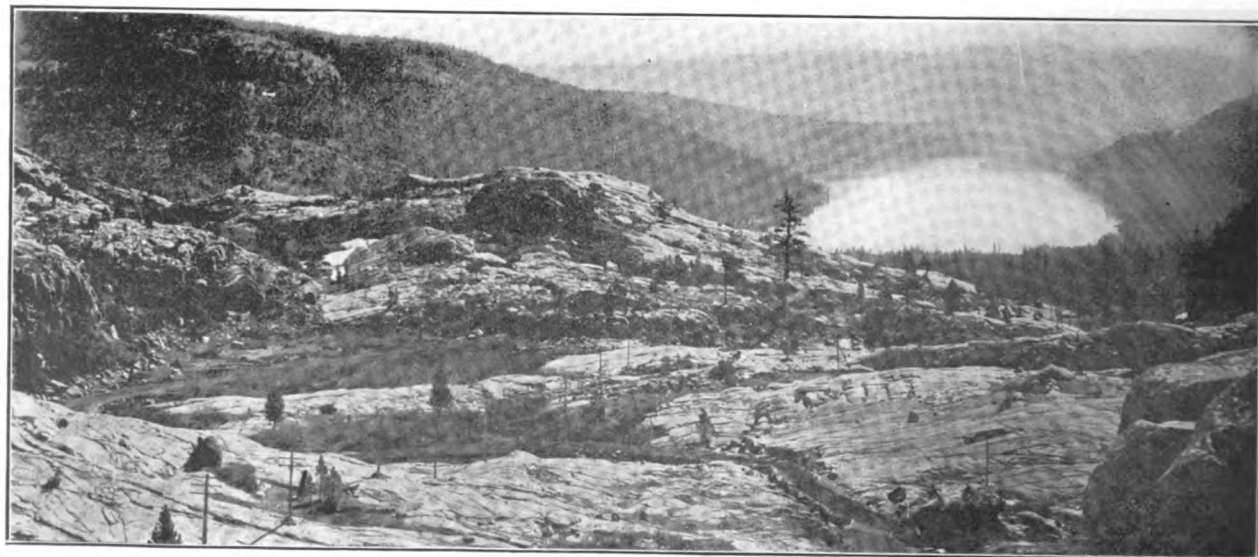
	Miles to	Total Miles	
	Out	Return	
Reno	0.0	0.0	152.7
Lawton	6.5	6.5	146.2
Verdi	5.5	12.0	140.7
Truckee, Cal.....	23.0	35.0	117.7
Emigrant Gap.....	32.0	67.0	85.7
Alta	12.0	79.0	73.7
Gold Run	4.0	83.0	69.7
Magra	3.5	86.5	66.2
Colfax	7.5	94.0	58.7
Welmar	5.2	99.2	53.5
Clipper Gap	6.7	105.9	46.8
Auburn	6.0	111.9	40.8
Folsom	19.0	130.9	21.8
Sacramento	21.8	152.7	0.0

Sacramento-San Francisco, 136.2 Miles.

	Miles to	Total Miles	
	Out	Return	
Sacramento	0.0	0.0	136.2
Elk Grove	14.8	14.8	121.4
McConnell	3.1	17.9	118.3
Arno	2.2	20.1	116.1
Galt	6.2	26.3	109.9
Woodbridge	7.3	33.6	102.6
Lodi	3.0	36.6	99.6
Stockton	15.8	52.4	83.8
French Camp.....	5.0	57.4	78.8
Banta	11.9	69.3	66.9
Janney	7.0	76.3	59.9
Alta Mont.....	11.6	87.9	48.3
Greenville	2.7	90.6	45.6
Livermore	4.6	95.2	41.0
Dublin	10.3	105.5	30.7
East Oakland.....	22.1	127.6	8.6
Oakland	3.1	130.7	5.5
San Francisco...	5.5	136.2	0.0

Alternative.*Julesburg-Cheyenne, 145.2 Miles.**

	Miles to	Total Miles	
	Out	Return	
Julesburg	0.0	0.0	145.2
Chappell, Neb.....	15.0	15.0	130.2



View of Donner Lake on the Emigrant Gap Route, West of Truckee, Cal., 7000 Feet Above Sea Level.

Lodgepole	9.5	24.5	120.7
Sunol	14.0	38.5	106.7
Sidney	4.5	43.0	102.2
Brownson	8.0	51.0	94.2
Herdon	5.5	56.5	88.7
Potter	5.5	62.0	83.2
Jacinto	4.5	66.5	78.7
Dix	4.5	71.0	74.2
Owasco	4.5	75.5	69.7
Kimball	5.0	80.5	64.7
Oliver	6.7	87.2	58.0
Bushnell	5.5	92.7	52.5
Pine Bluff, Wyo. 10.0		102.7	42.5
Egbert	10.5	113.2	32.0
Burns	10.0	123.2	22.0
Archer	14.0	137.2	8.0
Cheyenne	8.0	145.2	0.0

†Alternative.

Reno-Sacramento, 165.9 Miles.

	Miles to	Total Miles	
	Out	Return	
Reno	0.0	0.0	165.9
Steamh't Springs 11.5	11.5		154.4
Carson City..... 20.5	32.0		133.9
Edgewood	26.0	58.0	107.9
Meyers, Cal..... 9.7	67.7		98.2
Phillips	3.5	71.2	94.7
Echo	7.2	78.4	87.5
Kyburn	10.0	88.4	77.5
Riverton	10.0	98.4	67.5
Pacific	4.5	102.9	63.0
Camino	8.0	110.9	55.0
Placerville	7.0	117.9	48.0
Eldora	7.5	125.4	40.5
Shingle Spring.. 5.0	130.4		35.5
Clarksville	8.0	138.4	27.5



Where Rugged Sierra Nevadas Present Awe Inspiring Mountain Views.

White Rock.....	2.0	140.4	25.5	Perkins	6.0	159.9	6.0
Mills	13.5	153.9	12.0	Sacramento	6.0	165.9	0.0

ENCIRCLING THE NEW ENGLAND STATES.

A Nine-Day Tour Through the Housatonic Valley, the Litchfield and Berkshire Hills, Green and White Mountains and Famous Rangeley Lake District.

IN NO other section of the country is it possible to combine so much that is rich in natural beauty and historic associations as in New England. While it may be regarded as the original touring ground of the American motorist, the charm of its mountains, lakes, rivers and valleys is such that visitors come again and again, apparently finding it impossible to exhaust its resources. It has proven the mecca for tourists from all parts of the Union, even from those sections noted for their scenic grandeur. A large proportion of those who come from a distance will find it desirable to enter this district through New York City, and this has impelled the preparation of an itinerary practically encircling the New England states, starting from and returning to that centre. Other tours will be listed herein, giving optional routes, and as each itinerary may be used in connection with any other the reader will be able to arrange his plans as best meets his wishes, or the time available.

Leaving New York the first day, the route lies through the metropolitan residential suburbs of New Rochelle, Larchmont, Mamaroneck, Rye and Portchester to Greenwich, Conn., which, with its many splendid homes, is also a suburb of New York. At Stamford, a pretty little city with handsome drives, the tourist turns northward into the Litchfield foothills. Ridgefield is well known to New York people as a summer place. It gains its name because of a lofty ridge, called by the Indians Caudatowa. In May, 1777, a little band of militiamen here cost Gen. Tryon 170 men before he was able to capture the defense. On the way to Danbury, is to be seen the monument raised to Gen. Wooster, the commander of the Continental forces, by the Masons, who have a particular regard for his memory, because of the fact that he instituted the first lodge in the state, Hiram of New Haven.

Danbury is the home of the hat industry, the first American hat factory being located here in

1780, when Zadoc Benedict, with three men, was able to produce three hats a day. The town was destroyed by Gen. Tryon in his memorable raid of May, 1777, and with it a large quantity of army supplies stored there by the colonists. The road now makes a descent into the Housatonic valley.

At Brookfield, north of Danbury, hills, high and steep, characterize the landscape, and this condition continues for some distance. Above New Milford, the hills and mountain ranges recede from the river on either side, and the river bottoms broaden into the most delightful intervals and meadow lands. Beyond New Milford lies Kent, having all the dignity of a respectable New England village, besides a great deal of scenic beauty and fine natural situations that are not always found in connection with dignified and eminently respectable towns, even in New England.

West Cornwall is the gateway to a wild and picturesque region traversed by the Cornwall range.



Lake Mahkeenac as Seen from Shadow Crook, Lenox, Mass.

Curiously tumbled about, rocky and broken, are these mountains and they possess a charm all their own. Lime Rock is sufficiently suggestive of the region in its neighborhood, for here ledges of the whitest limestone, seamed with lines of gray and black, show gleaming in the sunlight, or as white and gray patches among the shadows of the woods.

At Falls Village, the Housatonic takes a series of tumbles from a primeval rock dam, extending almost across the river bed, as a beginning of the descent, thence over a succession of natural terraces, alternating at no great distance, rushing and foaming and boiling among thickly strewn boulders, until it has fallen 130 feet. The falls not only form one of the most picturesque scenes on the whole trip, but furnish power for extensive manufacturing operations.

At Great Barrington, a side trip may be taken to Purgatory, a curious rock formation. Monument mountain is on the way to Stockbridge. On the east side is a white quartz cliff of considerable depth, detached from which is Pulpit rock. On the north side of the mountain is the Profile. A short distance beyond Stockbridge is Lake Mahkeenac, a beautiful calm sheet of water, surrounded by hills, with the village and spires of Curtisville peering over the trees toward the south.

Stockbridge and Lenox are known for the singular purity of their air. Many summer homes of wealthy people are located in this

immediate vicinity, and add their beauty to that of nature. From Bald Head is gained a splendid view of the Berkshires and the well known Housatonic valley.

Pittsfield, the Heart of the Berkshires, is the first night stop. It commands a view of the Lebanon valley which is unsurpassed. Balanced rock, near by, is one of the Berkshires' greatest natural curiosities. Its height is 18 feet and its estimated weight 150 tons. Resting upon one square foot of surface, this immense boulder is so evenly balanced that it may be swayed readily with a lever or by a man's weight. A number of interesting lakes are in this vicinity, including Pontoosuc, Ashley, Silver, Morewood and some others.

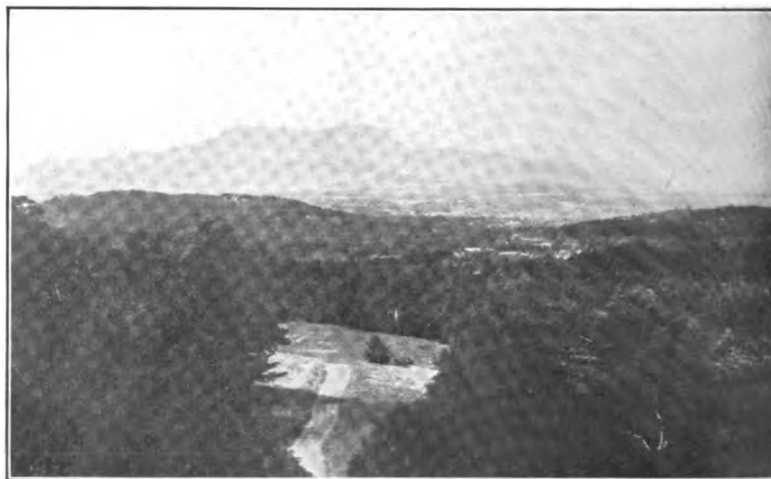
Pontoosuc lake is near Lanesboro, which is reached early on the second day. This town pos-

sesses beds of snow white granular quartz, used in the manufacture of superior cylinder glass. Variegated marble also is obtained here. Savage mountain and Constitution hill are picturesque heights a short distance away. Lanesboro was the birthplace of H. W. Shaw, known throughout the world as Josh Billings.

Midway between Mt. Greylock and Berlin mountain, is a pretty rural hamlet, South Williamstown, seat of the Greylock Institute for boys. Five miles further along is Williamstown, the reason for the existence of which is Williams College. The tour enters Vermont at Pownal, and approaches Bennington passing the famous battle monument on the way.

Beyond Arlington, the highway passes through the Sandgate notch, a remarkable cut in solid rock, 30 feet high, 800 long and 12 wide. Manchester is a quiet town at the base of Mt. Equinox. The sidewalks are of marble from the inexhaustible quarries on the mountains nearby. The route now enters a valley between the Green mountains on one side and the marble hills on the other, and slowly climbs up into the former. At Danby and beyond at Wallingford the lofty ridge of White Rocks is reached. Clarendon is passed on the way to Rutland.

The principal marble quarries and sawmills are at West Rutland, whence immense quantities of white marble are shipped to all parts of the world. Large gangs of saws, without teeth and cutting by means of sand poured in from



Mt. Greylock, One of the Highest Peaks of the Berkshires.

above, are constantly running. A little further along the tourist reaches Castleton, where there are extensive marble and slate quarries, and at which point an excellent imitation of marble is produced by coating the slate with marble deposit. Much of this stone is taken from quarries on the banks of Lake Bomoseen, a sheet of water eight miles long and from one to 2.5 in width.

At Hubbardton, an obelisk, near the Baptist church, marks the battlefield of July 7, 1777, soon after the evacuation of Fort Ticonderoga. Rich lake views are obtained from many points on the way past Lake Champlain, with glimpses of the Adirondacks in the distance. The night stop, as outlined, is at Burlington, the Queen City of Vermont. Here are several fine buildings, among them St. Paul's Episcopal church of blue limestone and with beautiful stained glass windows. The University of Vermont occupies a commanding position on a high hill, and near this is Green Mountain cemetery, in which lies the body of Ethan Allen, under a Tuscan column 42 feet high.

The way now leads along the valley of the Winooski river. Waterbury abounds with pleasant rambles and drives, with frequent glimpses of Camel's Hump and Mt. Washington, while Boston falls are near by. In the vicinity of Middlesex the river passes through a gorge 30 feet deep, 60 wide and 1300 long. Montpelier is the capital of the state and is situated on a plain near the river, surrounded by fertile farms. Under the portico of the State House are two cannons taken from the Hessians in the battle of Bennington in 1777, after a desperate struggle. The British got them back, but they were retaken by the Americans during the Canadian campaign and were presented to the state by Congress.

After leaving Montpelier, the route leads down into the valley of the Passumpsic, with its black, rock banks, which is crossed at St. Johnsbury. At the latter place considerable interest attaches to the works of the Fairbanks scales concern, particularly those which are made for use in Oriental countries, with their Chinese and Turkish numerals marked thereon.

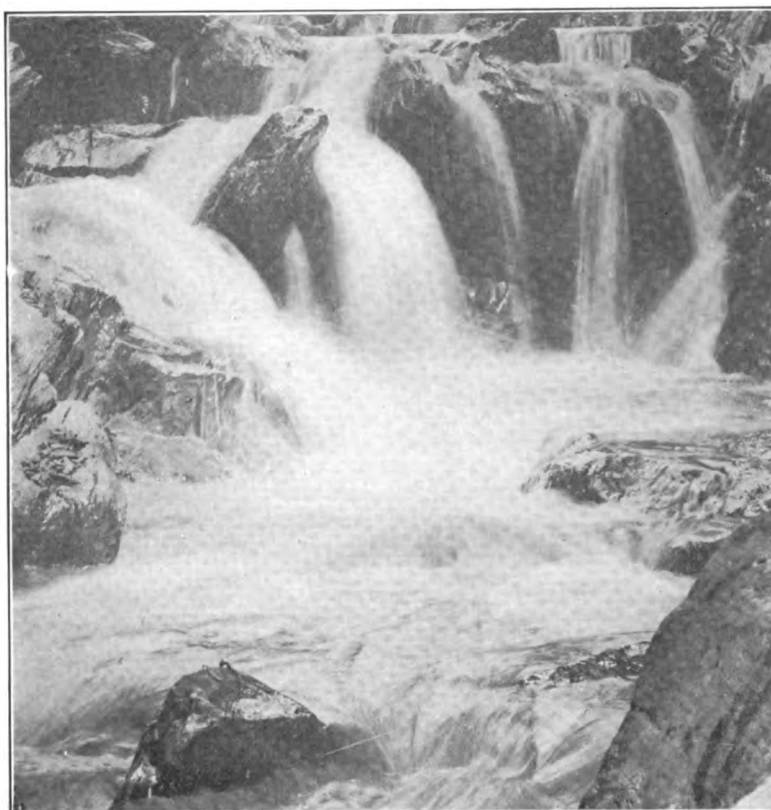
From the hills in the vicinity of Littleton, N. H., may be had a fine

panorama of the White mountains, and a little later the tourist enters the White mountain region at Bethlehem. No more beautiful view of the entire range can be secured from any other point. To the north and west are the mountains of Lancaster, the Percy peaks, the Pilot mountains and the great Presidential range. The night stop is at Bretton Woods, the very centre of the entire district.

The fourth day gives ample chance to test the car on mountain roads, but if additional trials are

in three or four plunges over ragged granite ledges. The third fall has a nearly perpendicular drop of over 70 feet, and its roaring is heard at a great distance.

From this point the route enters the Maine woods on the way to Rangeley lakes, passing through Mexico, Dixfield, Weld, Webb and Madrid. Many summer camps and once in a while a farm house serve to break up the monotony of the continual forest, of which there are nearly 100 square miles in this region. The trip is by no means uninteresting, however, for



View of Little River as it Tumbles over Bolton Falls, Vermont.

desired it is possible to connect with the road to the summit of Mt. Washington at Cherry Mountain or Gorham. For river scenery, combined with the impressive mountain forms, the vicinity of Gorham surpasses all the other districts from which the highest peaks are visible.

The drive to Gilead, Me., is along the river, with ever changing hill scenery on either hand. This continues through Mayville, North Bethel and Newry to Rumford Falls. Here the descent of the Androscoggin is over 150 feet

something new in the way of scenery is being spread out before the tourist all of the time. The elevation of the lakes is about 2000 feet, and the pure air and sparkling water make it a most desirable spot in which to spend a summer's vacation.

During the fifth day, the tourist has many more miles of Maine woods before him. The route from Rangeley lakes to Skowhegan, by way of Dead River, Green Farm, Stratton, Flagstaff, North New Portland and North Anson, is somewhat better known by auto-

mobillists than that over which the tour reached Rangeley. The scenery, still that of the woods, interspread with numerous ponds and lakes, is fully as inspiring as any to be seen in New England.

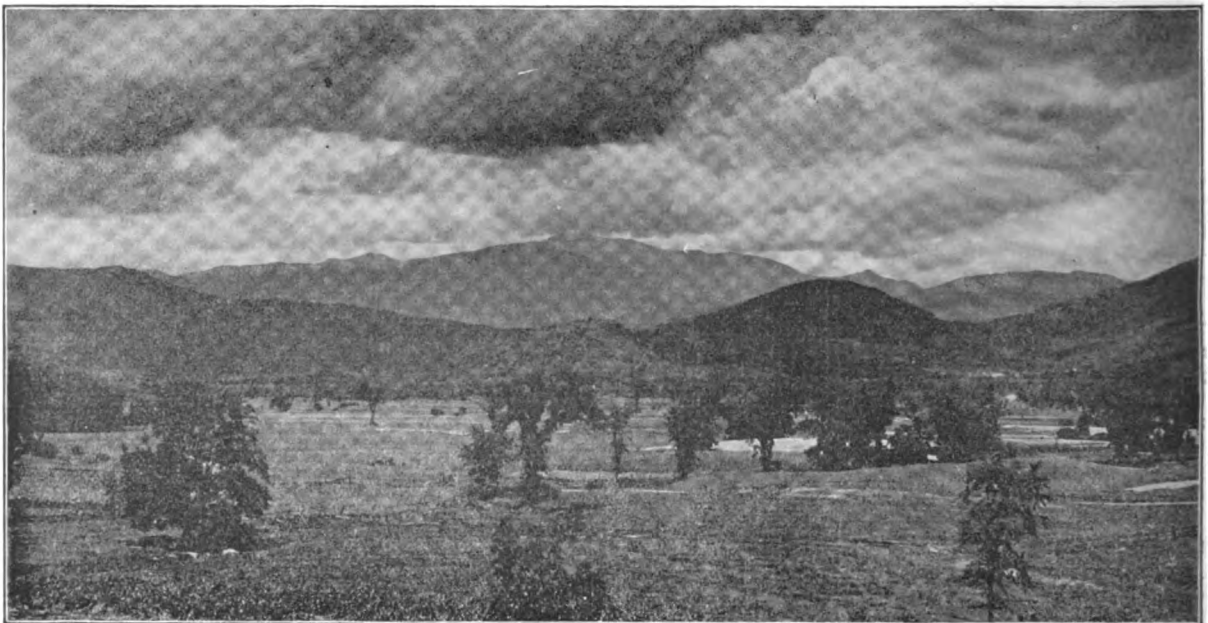
After leaving Skowhegan, fine fishing country is visited on the way to Pittsfield and Newport, the latter being located on the shores of Lake Sebasticook, which is 15 miles in circumference and affords most excellent fishing. The night stop is at Bangor, in size the second city of the state, and the second lumber mart in the world. The approach to the city, by way of Etna, Carmel and Hermon, gives commanding views of the hills at head of navigation on the

Penobscot bay, with its views of Mt. Desert in the distance. Camden is a pretty little town, with the two Megunticook peaks and a number of other smaller mountains to complete a picturesque group. Hills continue to furnish the change of scenery through Rockport and Rockland, the latter situated on Owl's Head bay. Here ship building is carried on, but the chief industry is lime burning. The kilns should be seen at night, and make a splendid addition to the hill and marine scenery about the city.

Thomaston is located on a deep, narrow harbor, and is the site of the Maine state prison, established in 1824. This was the scene of

rebuilt in 1759. William Phips was born in this town in 1651, and was a shepherd on its rocky hills. Later he learned the art of ship carpentry and in 1687, he succeeded in locating a Spanish treasure ship near the Bahamas, recovering something like \$1,500,000 worth of jewels and bars of gold and silver. For this he was knighted by the king and received \$80,000 of the treasure.

Bath was once a wealthy city, until the decline in American commerce seriously affected its ship building industry. It has a fine harbor, rarely bothered with ice, and the Kennebec at this point is very beautiful. The river is half a mile wide, and is rapid and deep.



One of the Splendid Views of the White Mountains from Bethlehem, N. H.—Mt. Washington in the Distance.

Penobscot. The tributaries of this river penetrate the great Maine forest in every direction, and bear downward to this city immense quantities of lumber, work on which may be seen at numerous places on the route.

The river is quite as picturesque below Bangor. During the war of 1812, the British attacked Hampden, plundered and overran the town for three days. Between Winterport and Frankfort may be seen the granite quarries around the base of Mt. Waldo. Belfast is a handsome little city built on a declivity which slopes to the water, with wide shady streets.

The route now passes along the

a sharp naval battle in 1724, when a fleet of 24 vessels, composed for the most part of captured fishing boats, engaged the colonial relief ships, which were forced to retire, greatly damaged by the Indian artillery. The fort which was built in 1720 withstood all attacks and was still standing during the Revolution.

Warren, another ship building town, was settled by Scotch and Irish in 1736. Waldoboro was settled by 1500 Germans in 1753, and some of their descendants still remain. Woolwich was founded in 1638, its Indian name being Naquasset, but was depopulated by an attack in 1696. It was

Some of the best shipbuilding lumber is floated down from its head waters.

Brunswick is a prosperous town at the falls and the head of the tidewater on the Androscoggin. The river falls 41 feet in three pitches and furnishes power for numerous factories. The town is also the seat of Bowdoin College. The pine groves in the rear of the college buildings are widely known for their sombre beauty.

Portland is the night stop. The city is situated on a high peninsula at the southwest end of Casco bay. Its harbor is deep, well sheltered, and is defended by powerful forts, while its numerous islands



Leon Lake, One of the Small Bodies of Water in Rangeley Lake Region.

afford favorite resorts during the summer season. Portland has been devastated by fire several times. It was burned by the Indians and British, and several large fires have destroyed portions of it since.

Near Biddeford, may be seen the ruins of Fort Mary, built in 1708. A quaint old house of the 17th century is also of interest. Between Saco and Kennebunk the tour crosses the Saco river, and at Biddeford may be seen the falls, which furnish power for a number of towns in that vicinity. Several of the famed Maine beaches are passed as the tourist proceeds on his way to Portsmouth, N. H.

This is a quaint and pleasant old city, with some very remarkable examples of colonial architecture. The old Church of St. John is worthy of a visit, as well as the Gov. Wentworth mansion at Little Harbor. This latter is a large, irregular building, dating from 1750, and contains the old provincial council chamber, as well as many quaint relics of the past.

The tour is arranged to visit the beaches in this immediate vicinity, all of which are famed for their beauties. The old chain bridge, three miles west of Newburyport, is the second suspension bridge in the world and the first in America. The Newburyport silver mines, which were opened in 1875 and for a time yielded richer ore than those of Nevada, are also near the city. Newbury

was settled in 1635, and for many years was noted for the wealth and aristocracy of its residents.

Rowley is a town composed largely of salt marsh. It was settled in 1638 by a nomadic church, led by Ezekiel Rogers. In 1650, he died, leaving his library to Harvard College. The first cloth made in America was turned out by these early settlers. Ipswich was the home of Cotton Mather. The town was purchased from the sagamore Masconnet for \$100 in 1633 by John Winthrop, the first governor of Connecticut.

Wenham lake has a world-wide

reputation for its ice, which is shipped to remote parts. This ice is kept entirely free from snow and is harvested when about a foot thick, yielding about 1000 tons to the acre. Beverly was known as the summer capital during the administration of former President Taft. Other North Shore towns passed on the way to Boston, are Salem, home of Salem witchcraft, with its witch's hill, the East India Marine Hall, Plumber Hall and other historic associations; Lynn, with its first shoe factory in America, its Dungeon rock, where pirates are said to have held sway, and the home of Molly Pitcher; Revere Beach, a favorite summer amusement park; Somerville, one of the richest suburbs of Boston; and Cambridge with its Harvard University, Washington elm and Longfellow's home.

Boston is filled with points of interest, but a bare mention of some of them will suffice. These would include the Old South church, Paul Revere's home, the old State House, Faneuil Hall, the Public Gardens, the library, the Christian Science church, the Museum of Fine Arts, and other equally famous buildings and places. From this city to Providence the way is over macadam for its entire distance.

The wide streets of Dedham are over-arched with handsome elms, and the sidewalks are fringed with arbor-vitae. Among the points of interest may be mentioned St. Paul's church, a handsome Gothic



Typical View of the Rugged Character of the Sea Coast in Maine.

structure, and the ancient cemetery alongside it. The town has many old mansions in wide and pleasant grounds, and is considered by many as the most beautiful in eastern Massachusetts.

Wrentham is the home of Helen Keller. Much of her life has been spent there, and, although her sightless eyes are unable to view the many beautiful drives and walks in that vicinity, they are very dear to her. Lake Pearl is fast becoming a delightful summer resort for Providence and Boston people. North Attleboro is particularly notable for its fine homes, and it is one of the centres

memorials to him, and his body rests in North cemetery. There are many places of interest, including the State House, with its handsome portrait of Washington; the ancient First Baptist church, founded by Roger Williams; the Athenaeum, with its wealth of fine paintings; and the buildings of Brown University and others.

On the way to Apponaug, the tour passes Roger Williams park, given to the city by Betsy Williams, great-great-granddaughter of the man whose name it bears. It includes 100 acres of beautifully diversified land and the venerable gambrel roofed home of the donor.

edge of the pine and cedar swamp.

Narragansett Pier is one of the best known shore resorts in the country. It is at the height of its glory during the touring season, when its many large hotels are filled with prominent people. Then comes Wakefield, Charlestown and Westerly, the latter the home of the Seventh Day Adventists. If the tourist happens to reach this town on Saturday, he will find little business going on and the church bells ringing.

Of Stonington it was once written that it "suffers in religion because of its nearness to Rhode Island." However true that may have been at that time, it certainly suffers nothing because of being pleasantly situated with a fine outlook upon Long Island sound. Its quiet streets are embellished here and there by iron relics of 1814.

Near Mystic, is Pequot hill, the scene of the battle between the allied English and Indian forces against the Pequots. Upon arriving at the Indian fort the allies of the English at first declined to aid in the attack and the colonists decided to make the attempt alone. As they were kneeling in prayer, the sachem Wequash was so impressed with the sight that he became converted and preached Christianity throughout New England until he suffered martyrdom.

New London is the last night stop and there are several points of interest in and about the city, among which may be mentioned the only house still standing, which was left by Benedict Arnold when he burned the town during the Revolution; the building in which Nathan Hale taught school, now standing near "Ye Ancientist Burying Ground," and others.

The way back to New York, the last day, is over the so-called shore line route, along the Long Island sound. Lyme is a venerable hamlet, buried in foliage, its main street lined with old trees and historic mansions. At Saybrook Point was an old fort, built in 1635, which was destroyed in 1871 in order that the railroad might be cut through. It was in a fair state of preservation, and its long history should have deserved for it a more noble end. The new bridge over the Connecticut river at Saybrook makes it unnecessary to utilize the ferry as was formerly the case.



Winding Road Leading up East Rock in New Haven, Conn.

for the manufacture of jewelry in this district.

Pawtucket, R. I., was the scene of the total destruction of Capt. Pierce and his 70 men in 1676. Surprised by the Indians he was driven back to the river by a shower of arrows, and when help came not one man was left. It is the home of the first cotton mill in the country, a building which is still standing and may be seen above the falls of the Blackstone river in the centre of the city.

Providence was settled by Roger Williams, after being driven out of Salem. The city abounds with

At Wickford may be seen the curious old square Episcopal church built in 1707, the block house erected for defense in 1641, and the rolling rock, where Roger Williams and Canonicus signed their compact.

This is all historic country, and recent discoveries in the hieroglyphics on some of the rocks proclaim that it was at this point Norsemen first landed to communicate with the Indians hundreds of years before the discovery of America by Columbus. On the way to Saundertown are the ruins of the old Narragansett fort on the

Westbrook, Clinton and Madison are pretty summer shore resorts, still untouched by the trolley and lacking the noisy amusement parks of those nearer the Elm City. Guilford was the hiding place of the regicides for a time. Between Guilford and Madison is Sachem's Head, so named because during the extermination of the Pequots, Uncas, the Mohegan sachem, pursued and shot a Pequot chief, placing his head in the fork of an oak tree, where it remained for many years. Branford bay is dotted with the Thimble islands, on which many summer homes are located.

At New Haven the buildings of Yale University are of particular interest, and if time permits, the Art School and Peabody Museum of Natural History should be visited. The way then leads through several shore resorts of more than local importance, including Savin Rock and Woodmont, the latter being a borough and the first in Connecticut in which women had a vote for local officials. Bridgeport is termed the Park City, which is sufficient to indicate that time might profitably be spent in viewing some of its very fine park property. The outward route is reached at Stamford.

ITINERARY NO. 11.

Night Stops—New York City; Pittsfield, Mass.; Burlington, Vt.; Bretton Woods, N. H.; Rangeley, Bangor and Portland, Me.; Boston, Mass.; New London, Conn. Nine Days, 1202 Miles.

New York-Pittsfield, 141.9 Miles.

	Miles to	Total Miles
	Out Return	
New York	0.0	141.9
New Rochelle	16.7	125.2
Larchmont	1.8	123.4
Mamaroneck	1.6	121.8
Rye	3.7	118.1
Portchester	1.7	116.4
Greenwich, Conn.	3.1	113.3
Mianus	2.4	110.9
Stamford	2.7	108.2
Springdale	3.6	104.6
New Canaan	4.2	100.4
Ridgefield	10.7	89.7
Danbury	9.6	80.1
Brookfield	4.2	75.9
New Milford	4.1	71.8
Boardman	3.0	68.8
Gaylordsville	4.5	64.3

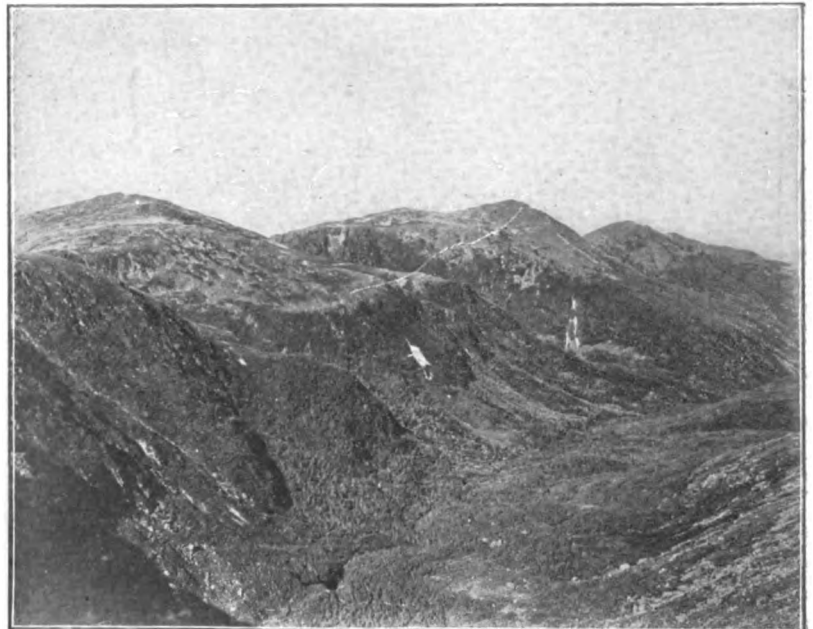
South Kent	2.5	80.1	61.8
Kent	3.5	83.6	58.3
North Kent	4.0	87.6	54.3
Swift's Bridge	3.2	90.8	51.1
Cornwall Bridge	2.0	92.8	49.1
West Cornwall	4.2	97.0	44.9
Lime Rock	4.6	101.6	40.3
Falls Village	2.0	103.6	38.3
South Canaan	1.8	105.4	36.5
Canaan	4.2	109.6	32.3
Ashley Falls, Mass.	2.2	111.8	30.1
Sheffield	4.0	115.8	26.1
Great Barrington	6.1	121.9	20.0
Stockbridge	7.4	129.3	12.6
Lenox	6.0	135.3	6.6
Pittsfield	6.6	141.9	0.0

Pittsfield-Burlington, 170.4 Miles.

	Miles to	Total Miles
	Out Return	
Pittsfield	0.0	170.4
Lanesboro	5.2	165.2

Shelburne 15.8 163.5 6.9
Burlington 6.9 170.4 0.0
Burlington-Bretton Woods,
115.4 Miles.

	Miles to	Total Miles
	Out Return	
Burlington	0.0	0.0 115.4
Walliston	8.0	8.0 107.4
Richmond	5.2	13.2 102.2
West Bolton	4.6	17.8 97.6
Bolton	1.9	19.7 95.7
Waterbury	7.7	27.4 88.0
Middlesex Station	5.4	32.8 82.6
Montpelier	6.4	39.2 76.2
East Montpelier	7.1	46.3 69.1
Plainfield	3.5	49.8 65.6
Marshfield	7.1	56.9 58.5
Molly's Falls	1.8	58.7 56.7
South Cabot	2.9	61.6 53.8
West Danville	5.7	67.3 48.1
Danville	3.0	70.3 45.1
St. Johnsbury	7.7	78.0 37.4
Gaskill	6.0	84.0 31.4



View of Franconia Notch and Bald Peak in the White Mountain Region.

S. Williamstown	11.3	16.5	153.9
Williamstown	5.0	21.5	148.9
Pownal, Vt.	4.4	25.9	144.5
Bennington	9.4	35.3	135.1
S. Shaftsbury	5.3	40.6	129.8
Arlington	9.9	50.5	119.9
Manchester	8.0	58.5	111.9
East Dorset	6.5	65.0	105.4
Danby	7.4	72.4	98.0
Wallington	9.4	81.8	88.6
Clarendon	3.4	85.2	85.2
Rutland	6.6	91.8	78.6
West Rutland	4.0	95.8	74.6
Castleton	7.4	103.2	67.2
Castleton Corners	1.7	104.9	65.5
Hubbardton	7.1	112.0	58.4
Hyde Manor	5.7	117.7	52.7
Sudbury	1.3	119.0	51.4
Whiting	4.6	123.6	46.8
Cornwall	6.9	130.5	39.9
Middlebury	4.3	134.8	35.6
Brookville	3.6	138.4	32.0
New Haven Junction	5.5	143.0	26.5
Vergennes	3.8	147.7	22.7
Lower Waterford	4.0	88.0	27.4
Waterford	3.0	91.0	24.4
Littleton, N. H.	5.0	96.0	19.4
Bethlehem	5.0	101.0	14.4
Twin Mountain House	8.3	109.3	6.1
Bretton Woods	6.1	115.4	0.0

Bretton Woods-Rangeley,
129.3 Miles.

	Miles to	Total Miles
	Out Return	
Bretton Woods	0.0	0.0 129.3
Carroll	7.4	7.4 121.9
Cherry Mountain	6.8	14.2 115.1
Highlands Station	3.3	17.5 111.8
Randolph	7.3	24.8 104.5
Gorham	6.6	31.4 97.9
Shelburne	6.0	37.4 91.9
Gilead, Me.	6.0	43.4 85.9
Mayville	9.5	52.9 76.4
North Bethel	1.5	54.4 74.9
Newry	4.0	58.4 70.9
Rumford Point	7.5	65.9 63.4

Rumford Falls...	10.5	76.4	52.9
Mexico	1.2	77.6	51.7
Dixfield	4.8	82.4	46.9
Weld	13.4	95.8	33.5
Webb	3.0	98.8	30.5
Madrid	14.6	113.4	15.9
Rangeley	15.9	129.3	0.0

Rangeley-Bangor, 129.4 Miles.

	Miles to	Total Miles	Out Return
Rangeley	0.0	0.0	129.4
Dead River	7.6	7.6	121.8
Green Farm	9.7	17.3	112.1
Stratton	2.3	19.6	109.8
Flagstaff	10.2	29.8	99.6
North New Port-land	27.2	57.0	72.4
North Anson	8.3	65.3	64.1
Skowhegan	10.7	76.0	53.4

North Searsport. 7.2	23.2	117.8
Swanville	3.3	26.5
Belfast	8.0	34.5
East Northport.. 3.0	37.5	103.5
Northport	4.1	41.6
Lincolnton	4.4	46.0
Camden	6.0	52.0
Rockport	2.0	54.0
Rockland	6.0	60.0
Thomaston	4.8	64.8
Warren	4.6	69.4
Waldoboro	6.1	75.5
Glendon	3.5	79.0
Nobleboro	1.4	80.4
Damariscotta	5.6	86.0
Newcastle	0.6	86.6
North Edgecomb. 6.9	93.5	47.5
Wiscasset	1.5	95.0
Montsweag	3.9	98.9
Nequasset	3.6	102.5

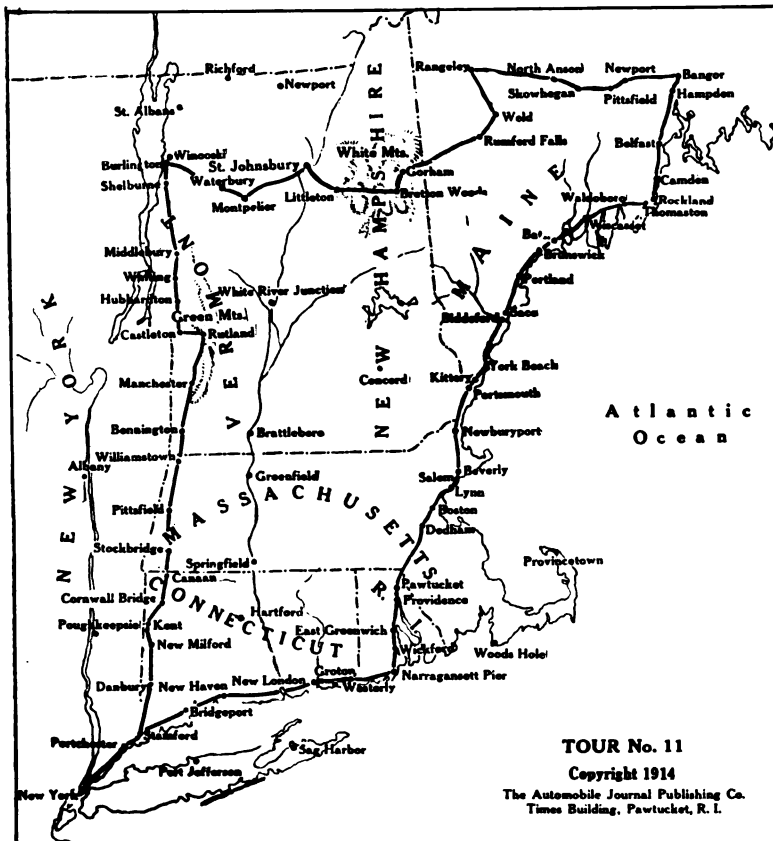
Biddeford	0.8	15.1	111.7
Kennebunk	8.1	23.2	103.6
Elms	4.3	27.5	99.3
Wells	2.0	29.5	97.3
Ogunquit	3.5	33.0	93.8
Cape Neddick	4.8	37.8	89.0
York Beach	1.7	39.5	87.3
York Harbor	3.0	42.5	84.3
York Village	0.5	43.0	83.8
York Corners	0.8	43.8	83.0
Kittery	7.1	50.9	75.9
Portsmouth, N. H. 0.9	51.8	75.9	
Rye Beach	9.3	61.1	65.7
Hampton Beach.. 7.5	68.6	58.3	
Hampton Harbor 0.8	69.4	57.4	
South Seabrook 3.4	72.8	54.0	
Salisbury	2.2	75.0	51.8
Newburyport, Mass.	2.6	77.6	49.3
Newbury	1.0	78.6	48.3
Newbury Old Town	2.7	81.3	45.5
Rowley	4.4	85.7	41.1
Ipswich	3.6	89.3	37.5
Wenham Lake	7.5	96.8	30.0
North Beverly... 0.7	97.5	29.3	
Beverly	3.3	100.8	26.0
Salem	1.7	102.5	24.3
Lynn	7.3	109.8	17.0
Revere Beach	5.6	115.4	11.4
Somerville	6.2	121.6	5.2
Cambridge	2.4	124.0	2.8
Boston	2.8	126.8	0.0

Boston-New London, 119.3 Miles.

	Miles to	Total Miles	Out Return
Boston	0.0	0.0	119.3
Dedham	10.9	10.9	108.4
Norwood	4.2	15.1	104.2
Walpole	4.1	19.2	100.1
Wrentham	6.9	26.1	93.2
Plainville	4.8	30.9	88.4
North Attleboro . 1.5	32.4	96.9	
Pawtucket, R. I. 8.0	40.4	78.9	
Providence	5.1	45.5	73.8
Apponaug	9.7	55.2	64.1
East Greenwich. 2.8	58.0	61.2	
Wickford	7.2	65.2	54.1
Hamilton	1.8	67.0	52.3
Saunderstown ... 3.3	70.3	49.0	
Narragansett Pier 6.8	77.1	42.3	
Wakefield	2.6	79.7	39.6
Charlestown ... 9.8	89.5	29.8	
Westerly	11.2	100.7	18.6
Waquetequoek ... 2.7	103.4	15.9	
Stonington, Conn. 2.5	105.9	13.4	
Myatie	4.5	110.4	8.9
Poquonock Bridge	4.0	114.4	4.9
Groton	3.9	118.3	1.0
New London ... 1.0	119.3	0.0	

New London-New York, 128.5 Miles.

	Miles to	Total Miles	Out Return
New London	0.0	0.0	128.5
Flanders	6.3	6.3	122.2
Lyme	9.6	15.9	112.6
Old Saybrook	10.5	26.4	102.1
Clinton	2.0	28.4	100.1
Madison	4.9	33.3	95.2
Gulford	5.2	38.5	90.0
Branford	9.0	47.5	81.0
East Haven	3.3	50.8	77.7
New Haven	4.1	54.9	73.6
West Haven	3.6	58.5	70.0
Savin Rock	1.1	59.6	68.9
Woodmont	4.0	63.6	64.9
Milford	4.7	68.3	60.2
Stratford	4.6	72.9	55.6
Bridgeport	3.8	76.7	51.8
Fairfield	4.5	81.2	47.3
Westport	1.6	82.8	45.7



Canaan	7.9	83.9	45.5
West Pittsfield .. 5.0	88.9	40.5	
Pittsfield	6.0	94.9	34.5
Detroit Station .. 4.5	99.4	30.0	
Newport	3.0	102.4	27.0
East Newport	3.2	105.6	23.8
Etna	5.3	110.9	18.5
Carmel	3.5	114.4	15.0
Herman	7.0	121.4	8.0
Herman Center.. 1.5	122.9	6.5	
Bangor	6.5	129.4	0.0

Bangor-Portland, 141 Miles.

	Miles to	Total Miles	Out Return
Bangor	0.0	0.0	141.0
East Hampden	3.0	3.0	138.0
Hampden	2.5	5.5	135.5
North Winterport 4.0	9.5	131.5	
Winterport	3.5	13.0	128.0
Frankfort	3.0	16.0	125.0

Woolwich	1.5	104.0	37.0
Bath	1.0	105.0	36.0
Cook's Corner	6.0	111.0	30.0
Brunswick	3.1	114.1	26.9
Hillside	4.4	118.5	22.5
Freeport	5.1	123.6	17.4
Yarmouth	5.4	129.0	12.0
Cumberland	2.8	131.8	9.2
Falmouth Fore-side	2.7	134.5	6.5
East Deering	4.5	139.0	2.0
Portland	2.0	141.0	0.0

Portland-Boston, 126.8 Miles.

	Miles to	Total Miles	Out Return
Portland	0.0	0.0	126.8
Oak Hill	5.9	5.9	120.9
Dunstan's	3.0	8.9	117.9
West Scarborough 1.8	10.7	116.1	
Saco	3.6	14.3	112.5

Norwalk	3.3	96.1	42.4	Greenwich	5.1	99.9	28.6	Larchmont	5.3	110.0	18.5
Darien	4.2	90.3	38.3	Portchester, N. Y. 3.1	103.0	25.5	New Rochelle....	1.8	111.8	14.7	
Stamford	4.5	94.8	33.7	Rye	1.7	104.7	23.8	New York.....	16.7	128.5	0.0

IN THE HEART OF THE MAINE WOODS.

Outlining a Week's Visit in Aroostook County and the Province of New Brunswick, with Return to Bangor by Way of the Coast and Washington County.

A FEW years ago Aroostook County, Maine, was an unknown wilderness. This applies in a measure to large portions of the district today, although the automobile has done much to overcome this, along the New Brunswick border. Not many sections of America, with the same population, area and conditions can muster more motor cars, and its roads are rapidly becoming such as to attract large numbers of tourists.

Beyond the fact that this is the very centre of the Maine woods, and that it is famed for the finest potatoes in the world, most motorists know little of Aroostook county. It follows from the above statement that not all of the district is covered with woods, although doubtless these virgin forests will have their appeal for the venturesome tourist. Fishing and hunting may be considered as ideal, and the entire section has been noted for years as a camping ground for vacationists.

Tour No. 12 is designed to occupy seven days, leaving from and returning to Bangor, from which point connection may be made with itinerary No. 11. This feature will appeal to many tourists from sections outside of New England, since it will be possible to add this trip to any of the others presented in this number. The night stops are at Houlton and Fort Kent, Me.; Woodstock, Fredericton and St. John, N. B., and Calais, Me. Of course, it is possible to return to Bangor over the outward route, if preferred, reducing the necessary time very materially.

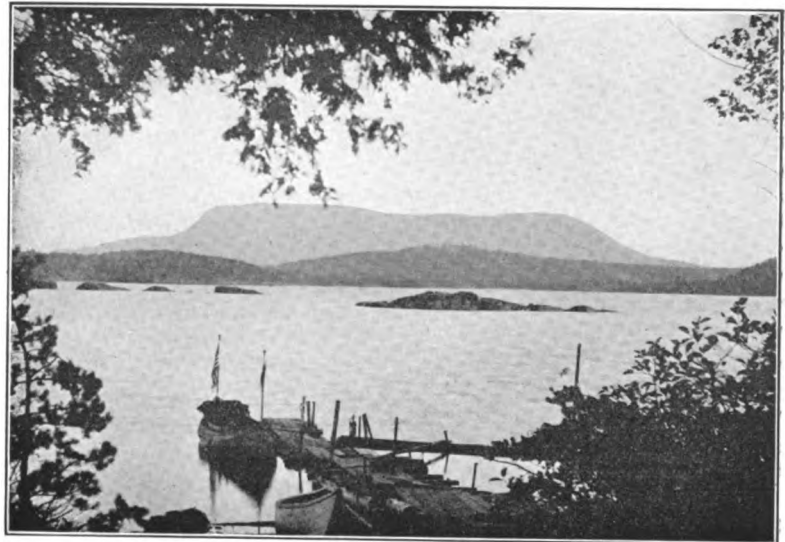
The way leads from Bangor along the Penobscot river to Veazie, the surface of the river being

covered with booms and immense rafts of timber, floated down from the Moosehead lake region and toward Mt. Katahdin, glimpses of which may be had from the distance. Accompanying the lumber in the river are the numerous saw mills along its banks. This is particularly true of Oldtown, but first, mention should be made of Orono, the seat of the University of Maine.

Oldtown is said to possess the largest lumber mill in the world,

that Maine became tributary to them by the Peace of Casco. The treaty of 1726 contains the substance of their present relations with the state. They own the islands in the Penobscot, and have a revenue of some \$7000 from the commonwealth. A ferry boat will take the tourist to their island home, and the visit is well worth while.

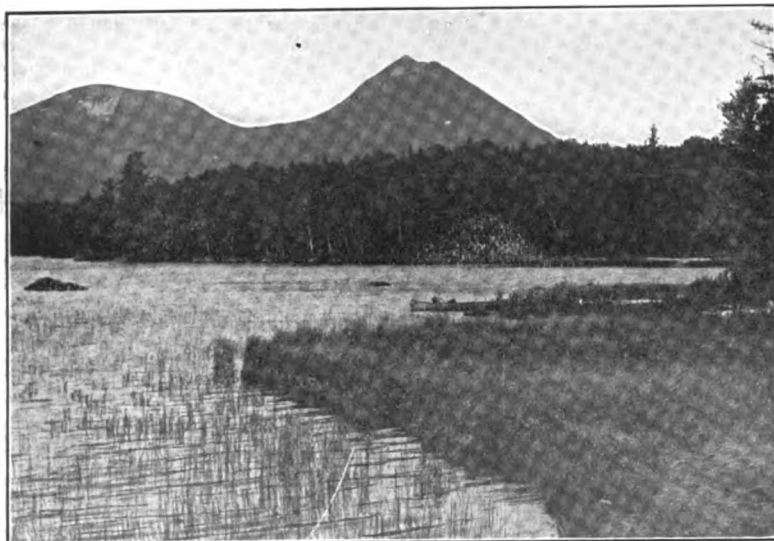
Leaving Oldtown, the route passes through a succession of thinly populated towns, Costigan,



View of Spencer Mountain from Lobster Lake in Central Maine.

where over 100 saws are at work turning the rude logs, which come in at one side, into planks, these being rafted down the river to Bangor. On an island near the town is the home of the Tarratine Indians, one of the three tribes of the Etchemin nation. Although the most powerful and warlike of the northern tribes, the Tarratines rarely attacked the colonists. After a series of wrongs and insults, however, they visited the settlements and inflicted such terrible damage

Olamon, Passadumkeag, Lincoln and Winn, to Mattawamkeag, a small village at the confluence of the Penobscot and Mattawamkeag rivers. Most of the inhabitants of these towns are engaged in lumbering. The last named village offers quite the best view of Mt. Katahdin, of volcanic origin, and Maine's chief claim to mountain scenery. From its rugged top may be seen all the lakes, rivers and woods of northern Maine, spread out like a map below. It



Mt. Katahdin, Maine's Highest Peak, as Seen from Kidney Pond.

is in the centre of the best moose country of the state, and a peak about which very little was known until quite recently.

From this point the tour passes through the heart of the Maine woods, abounding in spruce, cedar, hemlock, yellow and white birch, and maple. Splendid mills are to be found nearly all of the way, and particularly at Haynesville. Several important ponds are within easy access of the road, and the many streams throughout this district plunge on their way to the Atlantic over a succession of beautiful falls.

The night stop is at Houlton, the principal city of the county and noted for its beauty, its splendid homes and its hospitable people. Besides being engaged in the lumber business, Houlton is one of the principal markets for the famous Aroostook county potatoes. The soil in and about the city is wonderfully fertile, and the product is justly considered the finest in the world.

Presque Isle is the centre of the rich farming lands, which cover 500,000 acres. There also is good fishing and plenty of interesting scenery in the vicinity. Many Swedes have settled north of Presque Isle, as may be gathered from the name—New Sweden. Another extensive lumbering estab-

lishment is located at Van Buren, and lumbering also is carried on at Grand Isle. Madawaska was settled by the French, who were expelled from Arcadia in 1755. Twelve miles distant is New Fairfield, a famous starch centre.

Fort Kent, the second night stop, is the most northern town in the United States. It is located at the confluence of Fish river and the St. John. Five miles away is Eagle lake, and dozens of other handsome bodies of water are in the immediate vicinity. All of these, as well as the many streams,

are filled with big, gamy trout, and many salmon are caught in their season.

The return trip follows the outward itinerary to Van Buren, thence across the border into Grand Falls, N. B. Still other descendants of the Arcadians will be found in this vicinity. Here also the St. John river is contracted into a narrow gorge between lofty cliffs and plunges over a succession of rocky steps, the first in the series being a sheer drop of 40 feet.

Woodstock, the third night stop, is the shire town of Carleton county, New Brunswick, and is pleasantly situated on the banks of St. John river, 150 miles from its mouth. From this point it is possible to connect with the outward route at Houlton, Me., if desired, but the tour as outlined contemplates a visit to St. John, the way leading down the valley, so far as practical, with splendid mountain and lake views on either side.

Fredericton is a small city, beautifully situated on the river, and distinguished because of being the political capital of the province. The Government house is a plain and dignified stone building in extensive grounds just north of the city, and the Parliament house is a modern structure near the deserted barracks. The



Grand Falls, Webster Stream, One of Many Cataracts in Northern Maine.

University of New Brunswick has fine buildings on a commanding hill near the city.

From this point the St. John river is very picturesque, and a number of other streams empty into it at various points, adding to the charm. The way is very nearly all down grade. Numerous islands are passed, and the road crosses many rich intervals. At one or two places may be seen abandoned forts, which were the centre of long sieges 200 or 250 years ago. Just before reaching St. John the river enters a narrow channel between pallsades, and below is the suspension bridge over the famous reversing falls. The tides in the Bay of Fundy are well known throughout the world, and these falls, over which the river dashes through a narrow gorge at low tide, have the ap-

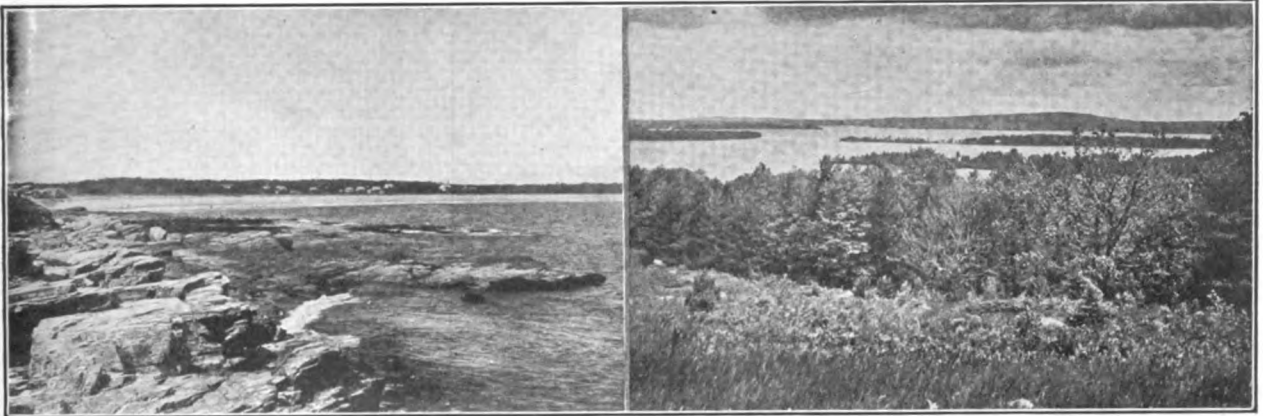
tion work begun in 1912 is sufficiently well advanced to permit of its use. The longer route outlined is the main line taken by most tourists from the provinces to the States, although the new road, when completed, will save a number of miles.

Calais, the night stop, is well known as the border town. The people of Calais and those of St. Stephen, across the river, in New Brunswick, always have lived on the most fraternal terms. They formed and kept a compact not to engage in the war of 1812. It is possible to make this region the basis for an extended stay in eastern Maine, spending some time about the Grand lakes, and a pretty little side trip to Eastport may be taken if desired.

Dennysville is a picturesque country village on the shore of

drives along the bay. Cherryfield, attractively situated on the picturesque Narraguagus river, is in the midst of several noted fishing ponds, and many well known woodcock covers are near here. The way next leads along the coast with its many indentations, and consequent fine marine views, through Steuben, Gouldsboro, etc., to Ellsworth, where connection may be made with Mt. Desert Isle and Bar Harbor, for automobiles are at last admitted to portions of the island.

It may be added in this connection that there is a much shorter route from Calais to Bangor, this running in almost a straight line between the two cities and covering a distance of practically 99 miles. The road is somewhat rough, however, grass growing between the wheel tracks in many



Inspiring Shore Scene Near Scarborough, Me.

One of the Fishing Lakes in Eastern Maine.

pearance of flowing up hill as the tide rushes upward through the gorge far above the river level.

St. John is the metropolis of the province and it is possible to make connection here for a number of pleasant trips through Nova Scotia, across the bay. Ample time should be available to take advantage of many interesting drives about the city, particularly that to the heights of Carleton; over Marsh bridge to Red Head, or to the cemetery and Loch Lomond.

The return trip to St. Stephen and Calais is along the coast, with splendid views all of the way. This is known as the St. George road, but care should be taken at Lepreaux that this old way is not followed between that town and St. George, unless the construc-

tion of the Dennys river, which flows between high banks wooded with evergreens and through gorges with rocky sides. Marion is in the heart of a splendid partridge country. Deer are also plentiful in this section. At East Machias may be seen one of the oldest Masonic lodge rooms in the country, the lodge having been instituted Sept. 10, 1779.

Machias is an historic old town, noted for its many business enterprises. The town is located on both sides of the Machias river at tidewater, and up this river, reached either by canoe or automobile, are numerous lakes, and a hunting and fishing territory embracing over 300,000 acres. Harrington, one of the prettiest little villages in Washington county, has a number of desirable

places. The country is of particular interest because of the virgin forests, and many excellent views are to be obtained.

Wesley is the first town of prominence to be reached, and is noted for the number of bears which have been shot within its confines. It does not follow that the tourist will see a bear if he takes this route, although he is pretty certain to find the woods well filled with deer in the immediate vicinity.

The covers about Beddington, 22 miles from Calais, are particularly well supplied with partridges, and there are a number of splendid camping sites to be found readily. Connection may be made here with the main route outlined, the distance between Beddington and Cherryfield being about 20 miles.

ITINERARY NO. 12.

Night Stops—Bangor, Houlton and Fort Kent, Me.; Woodstock, Fredericton and St. John, N. B.; Calais, Me. Seven Days, 764.6 Miles.

Bangor-Houlton, 118 Miles.

	Miles to	Total Miles	Out Return
Bangor	0.0	0.0	118.0
Veazie	4.3	4.3	113.7
Orono	3.6	7.9	110.1
Oldtown	6.1	14.0	104.0
Costigan	5.7	19.7	98.3

Bridgewater	7.6	20.1	97.3
Blaine	6.1	26.2	91.2
Mars Hill	1.0	27.2	90.2
Presque Isle	14.0	41.2	76.2
Caribou	12.9	54.1	63.3
New Sweden	8.9	63.0	54.4
Van Buren	9.0	72.0	45.4
Grand Isle	10.4	82.4	35.0
Madawaska	6.5	88.9	28.5
Frenchville	8.1	97.0	20.4
Fort Kent	20.4	117.4	0.0

Fort Kent-Woodstock, 131.2 Miles.

	Miles to	Total Miles	Out Return
Fort Kent	0.0	0.0	131.2
Frenchville	20.4	20.4	110.8
Madawaska	8.1	28.5	102.7
Grand Isle	6.5	35.0	96.2
Van Buren	10.4	45.4	85.8

Temple	16.7	16.7	63.3
Hawkshaw	9.0	25.7	54.3
Prince William	15.0	40.7	39.3
Long	5.0	45.7	34.3
Harvey	8.6	54.3	26.3
Hanwell	13.1	67.4	13.1
Fredericton	13.1	80.5	0.0

Fredericton-St. John, 94.1 Miles.

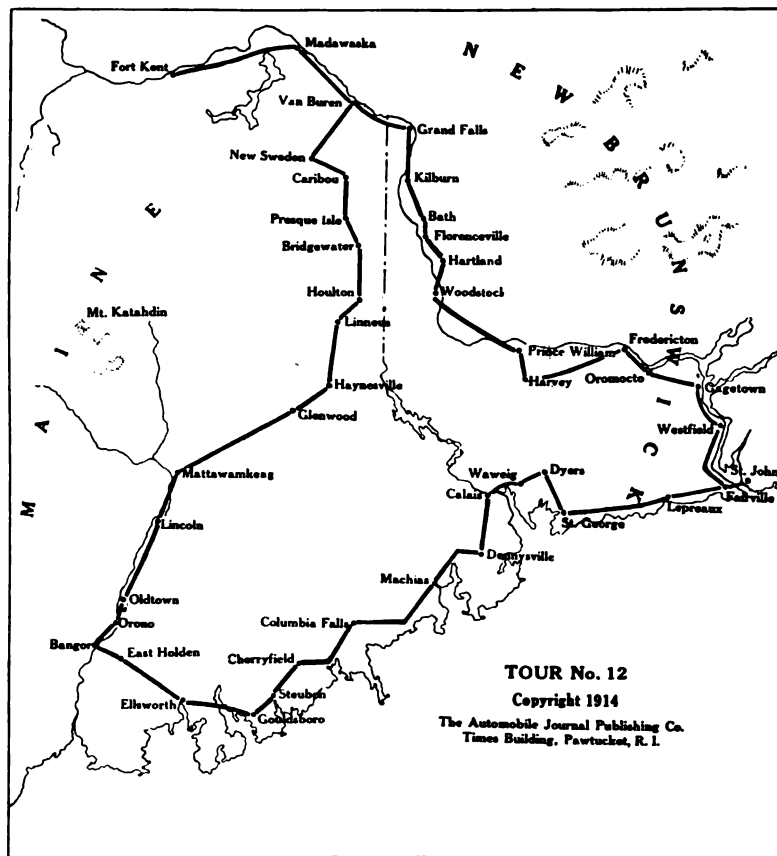
	Miles to	Total Miles	Out Return
Fredericton	0.0	0.0	94.1
Oromocto	12.0	12.0	82.1
Upper Gagetown	8.8	20.8	73.3
Gagetown	5.1	25.9	68.2
Otnalog	8.9	34.8	59.3
Hempstead	4.5	39.3	54.8
Evansville	3.2	42.5	51.6
Oak Point	13.0	55.5	38.6
Brown's Flats	11.2	66.7	27.4
Westfield	12.4	79.1	15.0
South Bay	8.8	87.9	6.2
Manchester Corner	2.0	89.9	4.2
Fairville	1.2	91.1	3.0
St. John	3.0	94.1	0.0

St. John-Calais, 87.4 Miles.

	Miles to	Total Miles	Out Return
St. John	0.0	0.0	87.4
Fairville	3.0	3.0	84.4
Manchester Corner	1.2	4.2	83.2
Spruce Lake	4.8	9.0	78.4
Musquash	7.7	16.7	70.7
Lepreau	8.8	25.5	61.9
New River Beach	8.0	33.5	53.9
Pennfield Corners	10.5	44.0	43.4
Spinney Corners	3.2	47.2	40.2
St. George	6.8	54.0	33.4
Stillwater Bridge	9.7	63.7	23.7
Digdequash	2.1	65.8	21.6
Dyers	3.0	68.8	18.6
Warveig	7.4	76.2	11.2
Roix	0.8	77.0	10.4
Oak Bay	2.9	79.9	7.5
Benson Corners	1.6	81.5	5.9
St. Stephen	5.1	86.6	0.8
Calais, Me.	0.8	87.4	0.0

Calais-Bangor, 136 Miles.

	Miles to	Total Miles	Out Return
Calais	0.0	0.0	136.0
Milltown	2.0	2.0	134.0
Charlotte	12.7	14.7	121.3
Dennysville	10.3	25.0	111.0
Marion	4.5	29.5	106.5
Gardner Corners	9.4	38.9	97.1
East Machias	4.1	43.0	93.0
Machias	4.5	47.5	88.5
Jonesboro	7.5	55.0	81.0
Columbia Falls	9.5	64.5	71.5
Harrington	5.3	69.8	66.3
Cherryfield	6.2	76.0	60.0
Smithville	6.1	82.1	53.9
Steuben	1.9	84.0	52.0
Gouldsboro	4.9	88.9	47.1
West Gouldsboro	2.6	91.5	44.5
East Sullivan	4.0	95.5	40.5
Sullivan	3.0	98.5	37.5
West Sullivan	1.6	100.1	35.9
Hancock	1.1	101.2	34.8
North Hancock	2.8	104.0	32.0
Ellsworth	6.5	110.5	25.5
North Ellsworth	5.0	115.5	20.5
Nicollin	1.4	116.9	19.1
East Dedham	3.2	120.1	15.9
East Holden	6.9	127.0	6.0
Hart's Corners	1.5	128.5	7.5
Holden	1.7	130.2	5.8
Brewer	4.8	135.0	1.0
Bangor	1.0	136.0	0.0



TOUR No. 12

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Olamon	8.5	28.2	89.8
Passadumkeag	4.3	32.5	85.5
South Lincoln	11.4	43.9	74.1
Lincoln	5.5	49.4	68.6
Lincoln Centre	1.9	51.3	66.7
Winn	8.9	60.2	57.8
Mattawamkeag	2.3	62.5	55.5
Molunkus	7.5	70.0	48.0
Macwahoc	2.4	72.4	45.6
Glenwood	12.1	84.5	33.5
Haynesville	7.4	91.9	26.1
Linneus	16.9	108.8	9.2
Houlton	9.2	118.0	0.0

Houlton-Fort Kent, 117.4 Miles.

	Miles to	Total Miles	Out Return
Houlton	0.0	0.0	117.4
Monticello	12.5	12.5	104.9

Grand Falls, N. B.	12.4	57.8	73.4
Aroostook Junction	18.0	75.8	55.4
Andover	5.7	81.5	49.7
Perth	0.9	82.4	48.8
Kilburn	7.3	89.7	41.5
Upper Kent	7.8	97.5	33.7
Bath	3.7	101.2	30.0
Bristol	3.6	104.8	26.4
Florenceville	2.8	107.6	23.6
Hartland	11.2	118.8	12.4
Victoria	2.5	121.3	9.9
Upper Woodstock	8.0	129.3	1.9
Woodstock	1.9	131.2	0.0

Woodstock-Fredericton, 80.5 Miles.

	Miles to	Total Miles	Out Return
Woodstock	0.0	0.0	80.5

TOURING THE MOOSEHEAD LAKE REGION.

Itinerary Also Includes Stop at Old Orchard, Portions of the Rangeley District and Some New Roads in the Heart of the White Mountains.

UNTIL a few years ago the ways leading into the wooded sections of Maine were little more than trails in many instances. The influence of the automobile has been just sufficient to change these trails into passable roads, without detracting from the pristine wildness of the sections through which they wind their way. This is particularly true of the Moosehead and Rangeley Lake regions, into which the accompanying itinerary leads the tourist.

Leaving Boston, the first day, the route takes the so-called short line to Newburyport and Portsmouth, and while the roads are not quite as ideal as those which skirt the North Shore, they are largely of macadam and good time can be made. The remainder of the distance into Old Orchard is over ground which is somewhat new to the present day tourist. Previous to 1907, when a disastrous fire visited this well known watering place, it was conceded to be one of the prettiest beaches in the country. Of late the automobile has helped it to regain its old time popularity in a measure.

Old Orchard comes into view long before it is reached, because of the long shore line which must be skirted. The beach itself extends from Saco river to Pine Point at the mouth of the Scarborough river, a distance of about 10 miles, with a breadth of 300 feet at low tide. The sand is very hard and smooth and affords an admirable driveway, as has been evidenced by the successful automobile races conducted thereon in 1911 and 1912. Because of the absence of the undertow, surf bathing is held to be perfectly safe. Near the hotels is a beautiful forest park of 30 acres, with pleasant paths, arbors and rustic adornments, while at Foxwell's brook is a picturesque waterfall 60 feet high. The beach derives its name from an old apple orchard, the last tree in which died before the Revolution.

The second day finds the tourist in Portland for the beginning

of the trip across the state into the Moosehead lake region. Brunswick was first settled as Pejepscot in 1628 and was three times destroyed by the Anasagunticooks before the present name was given it in 1737. It is the seat of Bowdoin College, and if time permits the Bowdoin gallery of paintings should be visited by all means. The falls of the Androscoggin at the head of tide water also are worthy of interest.

The immense ice houses on the banks of the Kennebec at Gardiner will attract attention, and it may be mentioned that the view

reconstructed for the most part for the use of motorists, and a splendid new garage has been erected at Greenville Junction, where the steamer meets the tourist for the journey to Mt. Kineo. Moosehead lake is famed in prose and poetry for its immense size and its scenic loveliness. It is the largest and best fishing ground in America. Deer and moose abound in great numbers in the vicinity. The lake itself is 40 miles long and from two to 18 miles wide. It contains many bays and beautiful islands, which add to the charm and fascination of the scenery.



View of Moosehead Lake from the Base of Mt. Kineo.

from the Common, which contains five acres and is situated on Church hill, 125 feet above the river, is superb. Hallowell is noted for its quarries of white and light gray granite. Augusta is the capital of the state and contains much of interest. The night stop is Waterville, the seat of Colby College, founded in 1813. The city is built along rambling streets on a broad plain above the river, near the Taconic falls, and has some very handsome residences.

The remainder of the distance to Moosehead lake is over ways

The surrounding hills are lofty and are covered with deep forests, while here and there a mountain towers above the green of the level woods, the whole forming a rare panorama of which the eye never tires. Grandest of all these is the famous Mt. Kineo, whose precipitous face looms up nearly 1000 feet above the surface of the lake, and whose western slope runs off into a level green-clad peninsula.

The route from Moosehead to Rangeley is through the Maine woods a greater portion of the way. The Rangeley lakes are five in



A Pleasing View of Kennebago Lake as Seen from Grant's Camp.

number, and have a total area of about 90 miles. All are interconnected by narrows and streams, making a continuous waterway of 56 miles. The Rangeleys are the source of the Androscoggin, which has its rise in Lake Umbagog, and emerges from the forest to find its way to the sea after turning scores of mill wheels. The farthest east is Lake Umbagog, conceded to be the gem of the entire chain and most often referred to as Rangeley. Its elevation is 2000 feet above sea level. Across the outlet is Bald Head, a mountain easy to climb, and an ideal spot from which to watch the sunrise. Mooselucmaguntic is the largest of the five. Separated but slightly from this and really a portion of the big lake is Cupsuptic. Then come Molechunkamunk and Wolokennebacock. The waters of all these are as clear as crystal and so large are the fish taken from them, it is an unwritten law that trout of less than three pounds shall be returned to their native element.

The fifth day takes the tourist into the White mountains, with night stop at Jefferson, N. H. The view of these peaks over the route selected is one of sublime grandeur, and it is maintained that the finest panorama of the Presidential range is to be found at Jefferson. It is held by some that this exceeds the view at Bethlehem, inasmuch as it is seen from one of the highest ridges of the entire district.

The return to Portsmouth is down the east side of the mountains over better known ways, past the famed Mt. Chocorua with its denuded peak, and several mountains of lesser note, as well as the beautiful Lake Ossipee and numerous other lakes and water ways, possessed of individual charm and beauty. While it is possible to utilize the outward route from Portsmouth into Boston, it is anticipated that the tourist will care to visit other scenes, and the route selected combines much of beauty and interest. The roads throughout this section are quite as good as well.

ITINERARY NO. 14.

Night Stops—Boston, Mass.; Old Orchard, Waterville, Moosehead Lake and Rangeley, Me.; Jefferson and Portsmouth, N. H. Seven Days, 766.6 Miles.

Boston-Old Orchard, 109.1 Miles.

	Miles to	Total Miles Out Return
Boston	0.0	0.0 109.1
Charlestown	1.7	1.7 107.4
Chelsea	1.8	3.5 105.6
Lynn	7.0	10.5 98.6
Salem	6.0	16.5 92.6
Beverly	1.5	18.0 91.1
South Hamilton	5.5	23.5 85.6
Ipswich	5.8	29.3 79.8
Rowley	3.6	32.9 76.2
Newburyport	8.0	40.9 68.2
Salisbury, N. H.	2.6	43.5 65.6
Hampton	7.5	51.0 58.1
Rye Beach	6.0	57.0 52.1
Portsmouth	9.3	66.3 42.8
Kittery, Me.	0.9	67.2 41.9
York Center	6.8	74.0 35.1
York Village	0.9	74.9 34.2
York Harbor	0.5	75.4 33.7
York Beach	3.0	78.4 30.7
Ogunquit	6.5	84.9 24.2
Wells	3.5	88.4 20.7
Kennebunk	5.2	93.6 15.5
Biddeford	8.1	101.7 7.4
Saco	1.9	103.6 5.5
Old Orchard	5.5	109.1 0.0

Old Orchard-Waterville, 98.7 Miles.

	Miles to	Total Miles Out Return
Old Orchard	0.0	0.0 98.7
Pine Point	4.0	4.0 94.7
Dunstan	5.5	9.5 89.2
Oak Hill	3.0	12.5 86.2
Portland	5.9	18.4 80.3
Falmouth Fore- side	6.1	24.5 74.2



The Rugged Peak of Mt. Chocorua Possesses an Individual Charm.



Canoeists Enjoying One of the Lakes in Central Maine.

	Miles to	Total Miles
	Out	Return
Cumberland	2.7	27.2
Yarmouth	2.8	30.0
Freeport	5.9	35.9
Hillside	4.9	40.8
Brunswick	3.9	44.7
Topsham	1.8	46.5
Bowdoinham	6.8	53.3
East Bowdoinham	3.8	57.1
Richmond	4.4	61.5
Gardiner	11.3	72.8
Farmingdale	1.5	74.3
Hallowell	3.0	77.3
Augusta	2.0	79.3
Vassalboro	11.9	91.2
Winslow	6.6	97.8
Waterville	0.9	98.7

Waterville-Moosehead Lake, 87.4 Miles.

	Miles to	Total Miles
	Out	Return
Waterville	0.0	0.0
Fairfield	3.2	3.2
Benton	2.5	5.7
Clinton	4.3	10.0
Burnham Junction	5.5	15.5
Pittsfield	7.5	23.0
Newport	7.3	30.3
Corinna	6.6	36.9
Dexter	8.4	45.3
Hazleton Corners	4.2	49.5
Silver Mills	1.0	50.5
Sangerville	8.4	58.9
Guilford	1.4	60.3
Abbott Village ..	3.0	63.3
Abbott	2.5	65.8
Monson Junction.	0.9	66.7
Monson	5.2	71.9
Shirley Corner ..	6.4	78.3
Greenville	7.7	86.0
Greenville Junction	1.4	87.4

Moosehead Lake-Rangeley, 135.6 Miles.

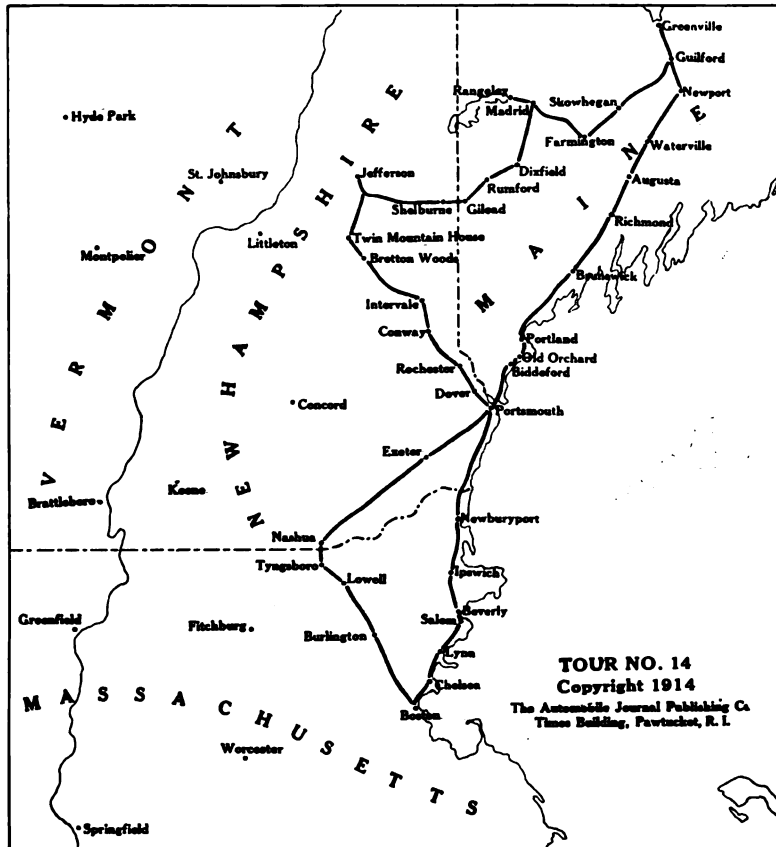
	Miles to	Total Miles
	Out	Return
Greenville Junction	0.0	0.0
Greenville	1.4	1.4
Shirley Corner ..	7.7	9.1
Monson	6.4	15.5
Monson Junction	5.2	20.7
Abbott	0.9	21.6
Abbott Village ..	2.5	24.1
Guilford	3.0	27.1
Parkman	5.0	32.1
Cambridge	6.8	38.9

Rangeley-Jefferson, 114.5 Miles.

	Miles to	Total Miles
	Out	Return
Rangeley	0.0	0.0
Madrid	15.9	15.9
Webb	14.6	30.5
Weld	3.0	33.5
Dixfield	13.4	46.9
Mexico	4.8	51.7
Rumford	0.9	52.6
Rumford Center ..	5.7	58.3
Rumford Point ..	4.0	62.3
Hanover	1.8	64.1
Newry	5.3	69.4
Bethel	6.2	75.6
West Bethel	3.5	79.1
Gilead	6.0	85.1
Shelburne, N. H.	6.0	91.1
Gorham	6.0	97.1
Randolph	6.6	103.7
Jefferson High-		
lands	6.0	109.7
Jefferson	4.8	114.5

Jefferson-Portsmouth, 131.2 Miles.

	Miles to	Total Miles
	Out	Return
Jefferson	0.0	0.0
Cherry Mountain	3.7	3.7
Twin Mountain		
House	8.8	12.5
Bretton Woods ..	6.1	18.6
Crawford House ..	3.3	21.9
Bemis	8.8	30.7
Bartlett	5.0	35.7
Glen	6.4	42.1
Intervale	4.0	46.1
North Conway ..	2.0	48.1





Silver Lake, in New Hampshire, with Mt. Chocorua in the Distance.

Conway	5.4	53.5	77.7	West Ossipee	4.3	68.7	62.5
Iona	4.4	57.9	73.3	Lakewood	2.9	71.6	59.6
Pequaket	3.0	60.9	70.3	Center Ossipee	3.2	74.8	56.4
Chocorua	3.5	64.4	66.8	Ossipee	5.4	80.2	51.0

Wakefield	9.5	89.7	41.5
Union	5.9	95.6	35.4
Milton	6.5	102.1	29.1
Rochester	8.3	110.4	20.8
Dover	9.0	119.4	11.8
Dover Point	6.5	125.9	5.3
Portsmouth	5.3	131.3	0.0

Portsmouth-Boston, 90.1 Miles.

	Miles to	Total Miles	
	Out	Return	
Portsmouth	0.0	0.0	90.1
Greenland	5.5	5.5	84.6
Stratham	5.0	10.5	79.6
Exeter	3.7	14.2	75.9
Kingston	6.5	20.7	69.4
Sandown	7.5	28.2	61.9
West Hampstead	3.0	31.2	58.9
East Derry	3.7	34.9	55.2
Derry	1.3	36.2	53.9
West Derry	1.2	37.4	52.7
Nashua	12.0	49.4	40.7
Tyngsboro, Mass.	6.6	56.0	34.1
Lowell	7.9	63.9	26.3
Billerica	6.2	70.1	20.0
Burlington	5.5	75.6	14.5
Arlington	7.4	83.0	7.1
Cambridge	3.5	86.5	3.6
Boston	3.6	90.1	0.0

MOUNTAIN LAKES OF NEW HAMPSHIRE.

First Day's Route Follows Closely That Taken by Paul Revere—Tour Furnishes Rich Scenic Beauties with Views of White Mountains in the Distance.

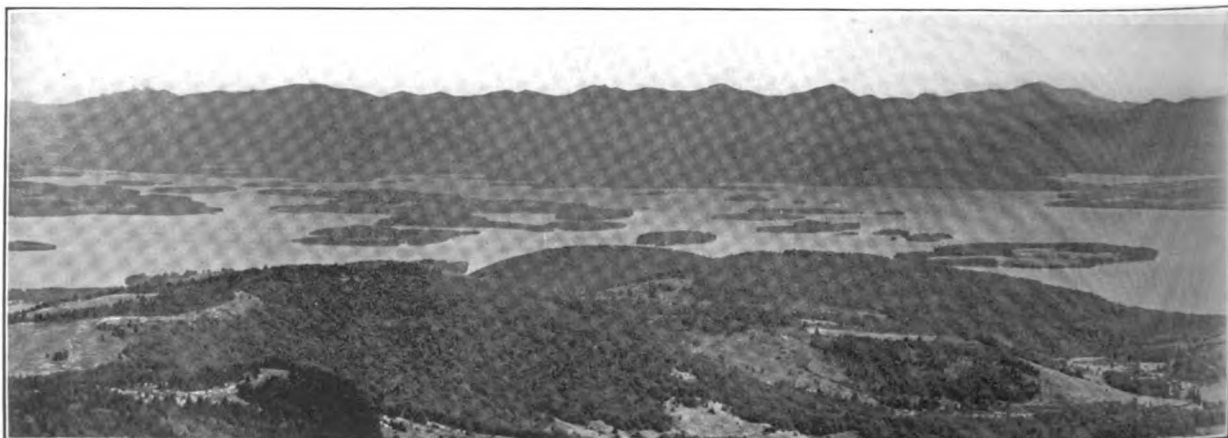
TOUR No. 21 has Boston for its starting point, and is suggested to cover three days, with night stops at Keene and Plymouth, N. H. Like all the itineraries listed in this number, it is possible, through connections at various points, to extend the vacation very materially if desired. The route covers much interesting country, particularly in southern New Hampshire, and many pleasing views of the White mountains are to be obtained at various points. Several very pretty lakes are within easy access by motor

car, and all told the itinerary should prove especially attractive to those in search of a short tour among the lesser New England hills.

Leaving Boston by way of Cambridge, Arlington and Lexington, the motorist follows closely the road covered by Paul Revere on his famous midnight ride. At numerous points on the way monuments have been erected setting forth the progress of that trip as well as other interesting historical data connected with the Revolutionary period.

Groton was visited in 1646 by the sachem Monoco at the head of 400 Indians, and the town burned, with the exception of four garrison houses, in which the people successfully defended themselves. Monoco boasted that he was on his way to Concord and Lexington to reduce these towns, and later would march upon Boston. The following year saw him in Boston, but with a rope around his neck, marching toward the Common, where he was hanged.

The way then leads across country to Ashby and over



A Charming Bird's Eye View of Lake Winnepesaukee, One of the Best Known of the New Hampshire Lakes.

the border into Keene, N. H., through the pretty little New Hampshire towns of East and West Rindge, East Jaffrey, Jaffrey and Marlboro. In the northwestern part of Jaffrey is Monadnock mountain, with its high and rugged top rising 3186 feet above the sea. In this town, also, may be seen the ancient church, now secularized, which was erected on the day of the battle of Bunker Hill. Workmen thereon are said to have heard the cannonading. Numerous drives about the lakes in this region are worth taking, if time be available.

Keene is a pleasant city in the valley of the Ashuelot river. Its original name was Upper Ashuelot, and signified "the collection of

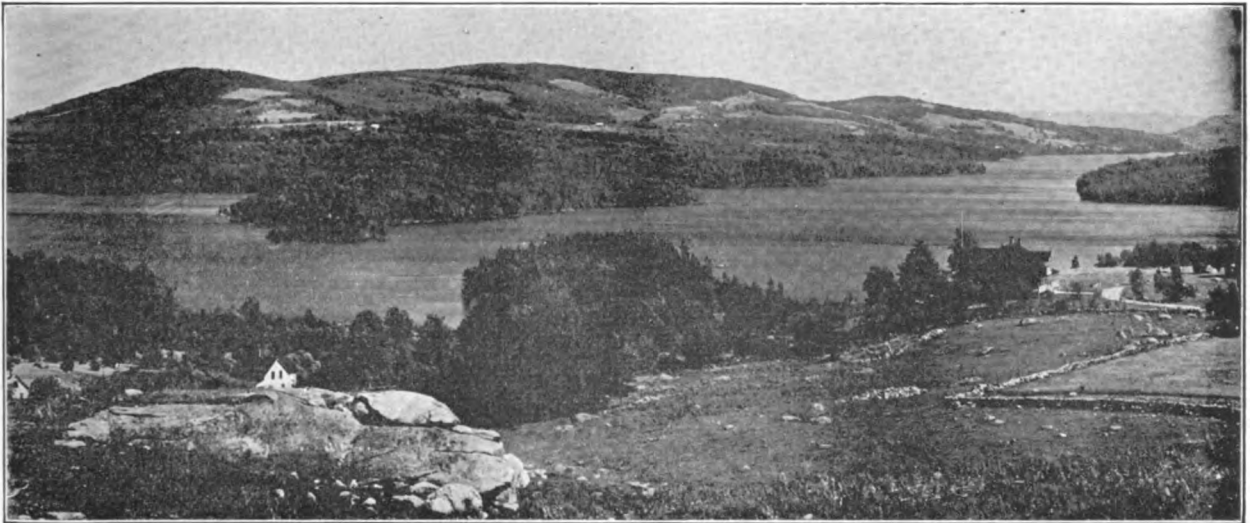
way of Newport, Guild, Sunapee and New London, the route lies toward the White mountains, with ever changing glimpses of the peaks in the distance. Entering the Pemigewasset valley, and passing Bristol, two miles further along, is Newfound lake, with Sugar Loaf mountain on the west shore and Crosby mountain on the east.

Plymouth, the night stop, is within easy view of the Franconia and White mountains to the north. Mt. Prospect, 2072 feet high, is a little to the northeast. It possesses a number of interesting features, notably the Miser's cave, the Avalanche, the Cold and the Boiling springs. Osceola and White Face are toward the northeast,

carved the initials of the chiefs of the Colonial survey of 1652, and with the words, "John Endicott, Gov." The waters of the lake reflect the shadows of several bold mountains and surround nearly 300 islands, large and small.

The Weirs is best known as a summering place, but at this point is located a large flood gate, so arranged that the flow of the waters from the lake into the Merrimac river is controlled for manufacturing purposes throughout the entire Merrimac valley to Newburyport, Mass. The return to Boston is through this valley as far as Lowell.

Franklin was the birthplace of Daniel Webster. Concord is the



Lake Sunapee, N. H., in the Midst of Romantic Scenery, and the Home of Gamy Bass.

many waters." Two miles north of the city are the Beaver Brook falls, where the brook flows over a stair-like succession of ledges 40 feet into a deep pool.

The second day finds the tourist approaching Lake Sunapee, 1104 feet above sea level, and nestling among the hills of Sullivan and Merrimac counties. The lake is about 10 miles long, indented with enticing bays and coves, and ranges from one-half to three miles in width. A short distance from its shores is the majestic Mt. Sunapee, which adds not a little to the beauty of the scenery. Connections may be made here with tour No. 31 for a visit to the White mountains, rejoining this itinerary at Plymouth.

Skirting this body of water by

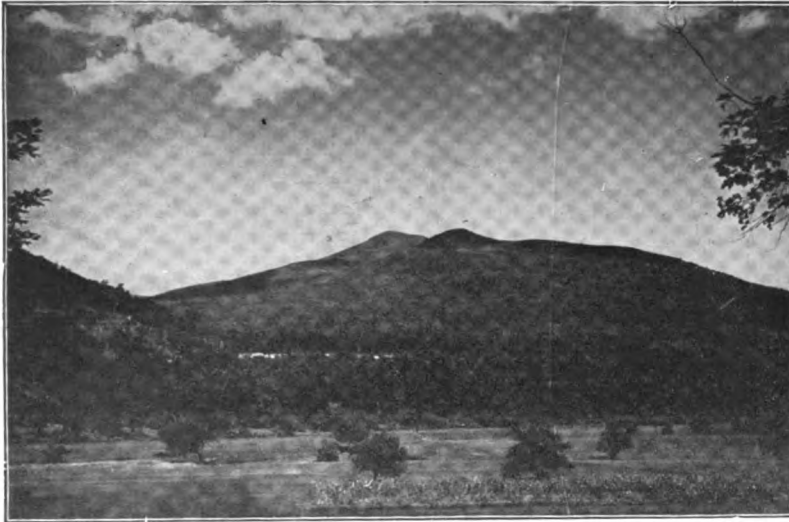
and just below Squam range to the east, is Squam lake, island dotted and very pretty. This is only a partial list of the lakes and mountains to be seen from Plymouth, most of which are located within a few miles' drive.

Connection may be made here with tour No. 22, which may be followed in the reverse direction to Bethlehem and thence to the Bretton Woods, or as planned, reaching the White mountain region at Conway and visiting the Maine woods, returning to Boston by way of Portland.

The third day visits Meredith on the way to Lake Winnepesaukee and The Weirs. Near the latter, on the banks of the lake, is Endicott rock, which is about 20 feet around, and on which are

capital of the state, and an abundance of shade trees gives it a pleasant embowered appearance. A splendid view may be obtained from the dome of the State House, and a number of the public buildings are worthy of attention.

At Manchester, the Amoskeag falls on the Merrimac river have a descent of 47 feet, with rapids above, and afford a fine sight. A short distance from this city is Lake Massabesic, which has 31 miles of shore with some beaches of remarkably white sand. The Fairy Cave and a curious sulphur cave, Devil's Den, are often visited by tourists, while in this vicinity. Nashua is the last New Hampshire town to be visited, and at this point may be seen some of the largest carpet mills in America.



Majestic Mt. Kearsarge as Seen from Intervale, N. H.

The water power is taken from Mine falls on the Nashua river, pleasing views of which are to be noted from time to time as the tour progresses. The Pawtucket falls, at Lowell, were a favorite fishing ground of the Indians. The Pawtucket canal extends from the head of the falls to the Concord river, below the city, and affords excellent water power, having a fall of 30 feet.

The outward route is rejoined at Arlington, after passing through Billerica and Burlington, although there are numerous methods of reaching the centre of the city from this point, practically all of them over excellent macadam roads.

ITINERARY NO. 21.

Night Stops—Boston, Mass.;
Keene and Plymouth, N. H.
Three Days, 308.7 Miles.

Boston-Keene, 83 Miles.

	Miles to	Total Miles
	Out	Return
Boston	0.0	0.0 83.0
Cambridge	3.6	3.6 79.4
Arlington	3.5	7.1 75.9
Lexington	4.4	11.5 71.5
Concord	7.0	18.5 64.5
North Acton	6.9	25.4 57.6
Littleton Common	2.8	28.2 54.8
North Littleton	1.5	29.7 53.3
Groton	6.1	35.8 47.2
Townsend Harbor	6.0	41.8 41.2
Townsend	1.2	43.0 40.0
West Townsend	2.0	45.0 38.0
Ashby	4.8	49.8 33.2
E. Rindge, N. H.	7.2	57.0 26.0
West Rindge	5.1	62.1 20.9

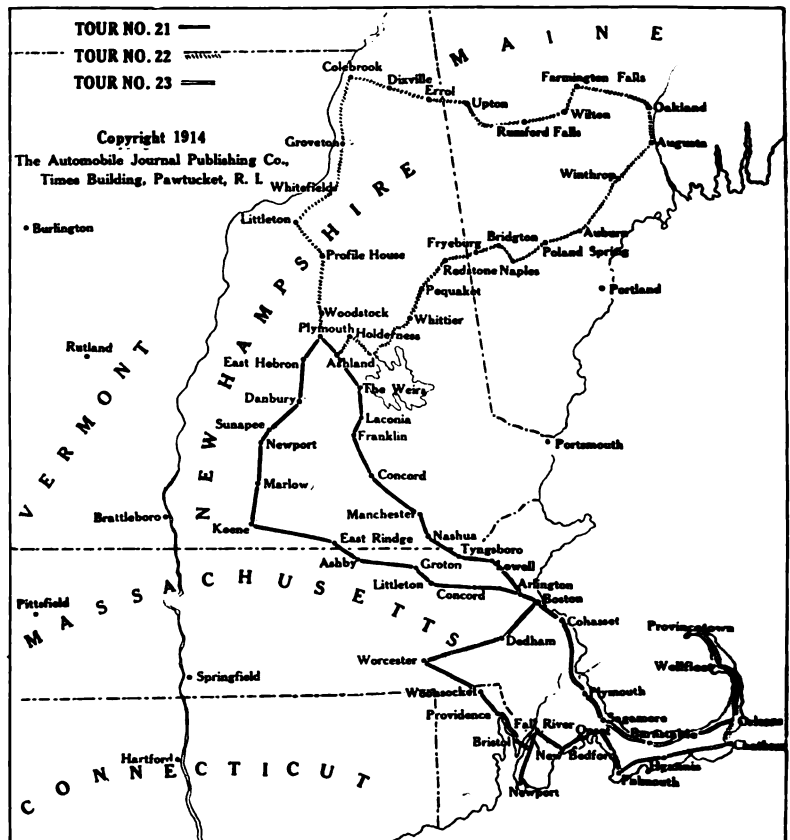
East Lempster...	9.0	24.8	65.3
Newport	4.7	35.6	54.4
Guild	2.4	38.0	52.0
Sunapee	3.2	41.3	48.8
George's Mills	3.6	44.8	45.3
New London	4.9	49.7	40.3
Elkins	3.1	52.8	37.2
Willmot	2.8	55.6	34.4
Danbury	6.8	62.4	27.6
Elmwood Village	1.3	63.7	26.3
Bristol	8.7	72.4	17.6
Bridgewater	3.9	76.3	13.7
East Hebron	4.9	81.3	8.8
Plymouth	8.8	90.0	0.0

Plymouth-Boston, 135.7 Miles.

	Miles to	Total Miles
	Out	Return
Plymouth	0.0	0.0 135.7
Ashland	5.9	5.9 129.8
Holderness	3.9	9.8 125.9
Meredith	7.9	17.7 118.0
The Weirs	4.7	22.4 113.3
Lakeport	4.6	27.0 108.7
Laconia	1.7	28.7 107.0
Winnisquam	3.0	31.7 104.0
Tilton	6.4	38.1 97.6
Franklin Falls	3.0	41.1 94.6
Franklin	0.8	41.9 93.8
Franklin Junction	1.6	43.5 92.2
North Boscawen	2.2	45.7 90.0
Boscawen	3.2	48.9 86.8
Penacook	3.4	52.3 83.4
West Concord	4.2	56.5 79.2
Concord	1.9	58.4 77.3
Pembroke	5.9	64.3 71.4
Suncook	1.4	65.7 70.0
Manchester	11.2	76.9 58.8
Merrimac	8.6	85.5 50.2
Thornton's Ferry	3.6	89.1 46.6
Nashua	5.9	95.0 40.7
Tyngaboro, Mass.	6.6	101.6 34.1

Keene-Plymouth, 90 Miles.

	Miles to	Total Miles
	Out	Return
Keene	0.0	0.0 90.0
Gilsum	8.7	8.7 81.3
Marlow	7.1	15.8 74.2
Mill Village	6.1	30.9 59.1



Lowell	7.9	100.5	26.2	Burlington	5.5	121.2	14.5	Cambridge	3.5	132.1	3.6
Billerica	6.2	115.7	20.0	Arlington	7.4	128.6	7.1	Boston	3.6	135.7	0.0

THE WONDERS OF DIXVILLE NOTCH.

Itinerary Includes the Northern Portion of the White Mountain Region and Affords Splendid Opportunity for Scenic Grandeurs.

TOUR No. 22 is planned to start from Augusta, Me., and visits the White mountains. It is suggested as another three-day vacation, but can be continued indefinitely, by combination with other tours at various points on the way. The night stops are at Dixville Notch and Center Harbor, N. H., while a very pleasing alternative may be obtained by joining tour No. 21 at Plymouth, N. H., for Boston. The entire journey from Augusta to Boston by both of these outlines used in combination could be made to occupy not more than five days, if desired, and would afford a fine vacation.

Leaving Augusta on the first day, the tour visits the Belgrade lakes, without doubt the finest bass fishing grounds in the country. The water of the lakes is very clear and the bottom decidedly rocky, making an ideal haunt for bass. The shores of both lakes are well wooded and some excellent views are to be obtained along the roads skirting their edges.

The itinerary as outlined leads into the Maine woods in the vicinity of the Rangeley lakes, through Hanover, Newry, Grafton Notch and Upton, into New Hampshire at Errol. On the way several lakes are passed, included among which are: Mollychunkamunk, Allegundabagog, Wellocksebacook and Umbagog, the last named being at Upton.

At Errol, the tourist finds himself in the heart of the White mountains. On every side, there are to be found signs of nature's handiwork on the way to Dixville Notch. Among these may be mentioned Table rock, reached from the road by a rude stairway of stone blocks known as Jacob's Ladder. The view is very extensive from this point, and amply repays for the strenuous climb. The rock is 561 feet above the road, 2450 above the sea and is a narrow pinnacle only about eight feet wide at the top, with sharp, precipitous sides.

The notch itself has high columnar sides, frowning at each other across the narrow chasm. These cliffs of decaying mica slate present a scene of ruin, transition and shattered strength, that is mournful and almost repulsive. The Notch is not a mountain pass, but a wonderful ravine among high hills. It has its flume, its cascades, its profiles, its snow cave,

than that which was left behind so recently, and divided from it by the Twin Mountain and Field Willing ranges. The Franconia region has two great natural wonders, either of which would make any other section famous. Twelve hundred feet above the lake, starting out from the blue crest of the mountain, stands a sculptured likeness of a giant Titan; the



View in the Flume at Dixville Notch in New Hampshire.

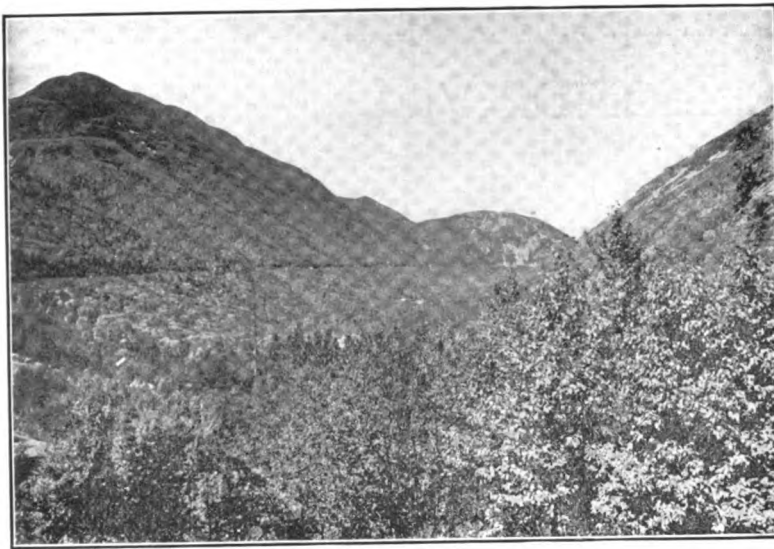
and its cold springs of the purest water known to science. Altogether it is a sight not to be missed, and well worth the climbing to which the car is subjected in reaching it.

The second day, the tourist again passes through this two miles of palisades on his way to Colebrook, where a detour may be made to Connecticut lake, at the head of the Connecticut river, down the valley which he will drive through for a time. At Littleton, connection may be made with itinerary No. 11, which may be taken in either direction.

This tour now enters the Franconia range, scarcely less grand

profile of the Old Man of the Mountain. The Flume, located some miles below, is a rock fissure 700 feet long and 60 deep, with fern decked granite walls from 10 to 20 feet apart; in reality a miniature canyon.

Continuing to Plymouth, where connection may be made with tour No. 21 for Boston, this tour turns eastward to Center Harbor, on Lake Winnepesaukee, for the night stop. The next morning, the journey will take the tourist up the eastern side of the White mountains, affording still more wonderful views. Chief among these is that of Mt. Chocorua with the lake of the same name near its



Charming View of the Crawford Notch as Seen from Willey Station.

base, also reached by tour No. 14.

At Conway the route leads away from the White mountain district and re-enters Maine at Fryeburg. A little later it visits the region of Lake Sebago and the well known resort at Poland Spring. Auburn and Lewiston, separated only by the Androscoggin river, are the last cities of importance passed on the way to Augusta. Lewiston falls, where the river breaks over a ledge of blackened gneiss, is worthy of note at this point. Lewiston is also the seat of Bates College, with its commodious buildings.

Near Winthrop is Lake Maranocook, the chief picnic ground of central Maine. It is a lovely winding lake, nine miles long, and about one mile wide, dotted with picturesque islands. West of the village is Mt. Pisgah, from which views of the White mountains are obtained.

ITINERARY NO. 12.

Night Stops—Augusta, Me.;
Dixville and Center Harbor,
N. H. Three Days, 391.3
Miles.

Augusta-Dixville, 135.4 Miles.

	Miles to	Total Miles
	Out	Return
Augusta	0.4	0.0 135.4
West Sidney	6.5	6.5 128.9
Oakland	1.5	8.0 127.4

Center Harbor-Augusta, 126.7
Miles.

	Miles to	Total Miles
	Out	Return
Center Harbor ..	0.0	0.0 126.7
New Sharon	7.6	35.6 99.8
Farmington Falls 4.1	39.7	95.7
Farmington	4.7	44.4 91.0
East Wilton	4.8	49.2 86.2
Wilton	2.9	52.1 83.3
East Dixfield	4.5	56.6 78.8
South Carthage ..	3.1	59.7 75.7
Dixfield	8.4	68.1 67.3
Ridgelyville	4.5	72.6 62.8
Rumford	1.8	74.4 61.0
Rumford Center ..	6.0	80.4 55.0
Rumford Point ..	3.9	84.3 51.1
Hanover	1.7	86.0 49.4
Newry	5.4	91.4 44.0
North Newry ...	5.1	96.5 38.9
Grafton Notch ...	11.9	108.4 27.0
Upton	4.1	112.5 22.9
Errol, N. H.	9.8	122.3 13.1
Dixville Notch ...	12.1	134.4 1.0
Dixville	1.0	135.4 0.0

Dixville-Center Harbor, 129.2
Miles.

	Miles to	Total Miles
	Out	Return
Dixville	0.0	0.0 129.2
Kidderville	3.7	3.7 125.5
Colebrook	6.7	10.4 118.8
Moultonboro	4.9	4.9 121.8
South Tamworth ..	8.1	13.0 113.7
Whittier	1.9	14.9 111.8
Tamworth	2.1	17.0 109.7
Chocoma	3.4	20.4 106.3
Pequaket	3.5	23.9 102.8
Iona	3.0	26.9 99.8
Conway Station ..	4.4	31.3 95.4
Conway	1.1	32.4 94.3
Redstone	3.4	35.8 90.9
Center Conway ..	1.7	37.5 89.2
Fryeburg, Me.	5.7	43.2 83.5
East Fryeburg ..	5.9	49.1 77.6
Bridgton	9.1	58.2 68.5
Naples	9.2	67.4 59.3
Cook's Mills	3.2	70.6 56.1
Webb's Mills	4.6	75.2 51.5
Poland Spring ..	8.8	84.0 42.7



Seaconnet Point and Light in Southeastern Rhode Island.

Danville Junction 5.5	89.5	37.2	Greene Corners.. 6.1	102.2	24.5	East Winthrop .. 4.2	120.2	6.5
Auburn 6.2	95.7	31.0	Greene Station... 2.1	104.3	22.4	Manchester 2.1	122.3	4.4
Lewiston 0.4	96.1	30.6	Winthrop .....11.7	116.0	19.7	Augusta 4.4	126.7	0.0

NEW ENGLAND'S MOST HISTORIC SECTION.

Along the South Shore to Plymouth and Provincetown, the Land of the Pilgrims, and Return to Boston by way of Newport, the Home of the Norsemen.

TOUR No. 23 offers a decided change from those heretofore outlined. Like them it is planned to occupy three days, and is so arranged that it may be utilized in combination with any of the others presented herewith. It starts from Boston, and Provincetown, Mass., and Newport, R. I., are the night stops. The tourist returning from the Maine woods by itinerary No. 11 may enter upon this tour at Boston, rejoining his original schedule at Narragansett Pier, R. I., by ferrying across the lower end of Narragansett bay from Newport. It will add at least two days more to the trip, but it will be found to be time very well spent.

The route lies along the south shore from Boston, through Quincy, Hingham, Cohasset and Kingston, all filled with summer homes of Boston people, to historic Plymouth. In fact the entire trip during the first day from this point is over historic ground. At Plymouth, the tourist will wish to see Forefathers Rock, on which it is said that the Pilgrims first set foot in making their landing in America; Burying Hill, with its graves of Miles Standish, John and Priscilla Alden, and others only a little less known; Pilgrim Hall, with its museum of Pilgrim relics; the plot of ground where the dead were buried during that first winter, and their graves sown with grain the next spring to keep the Indians in ignorance of their death, and many other noted scenes. The sites of interest to the tourist are clearly marked, and it is possible to determine with a fair degree of accuracy just where each of the central figures lived and moved during those early days which followed closely the year 1620.

The route lies along the north shore of Cape Cod, through a number of small towns, distinctive in their original quaintness, to Provincetown, in the harbor of

which the Mayflower was brought to anchor, while the members of the little band drew up their compact and signed it with their life's blood. The tourist goes over the route in the reverse direction from that in which the Mayflower sailed from Provincetown to Plymouth, but after a night on the tip end of Cape Cod he returns over a portion of the trip,

in giving to that section permanent highways, which will serve long as a memorial to him.

New Bedford and Fall River are large commercial centres in southeastern Massachusetts, the former having been for a number of years the home port of an extensive whaling fleet. The latter has an excellent harbor, and the numerous streams emptying into



Newport Beach, Now Operated as a Municipal Summer Shore Resort.

before shifting to the south shore.

From Chatham to Onset, the tour visits a number of towns, which have furnished numerous sailors for America's merchant marine, as well as the navy. Cape Cod has an individuality unlike that of any other section of the country. Connection may be made for Wood's Hole and Martha's Vineyard at West Falmouth. Buzzard's Bay is well known as the summer home of the late Grover Cleveland, while President.

Fairhaven was the home of the late H. H. Rogers, and the very excellent highways of the town practically were a gift from him. For years he was superintendent of streets in Fairhaven, but many times the salary voted by the town was expended by Mr. Rogers

it afford abundant water power for numerous manufacturing enterprises.

Newport is reached by the way of Tiverton and along the island of Rhode Island. It is famed the world over for its magnificent summer homes of wealthy people. Opportunity should be taken to visit a number of these. The cliff walk, leading for several miles along the shore and through many of the estates, is also of interest. Aside from the summer homes, Newport has much of historical value, and among these features may be mentioned the Old Stone Mill, found standing on the highest point in the city when the settlers first cleared away the underbrush, and supposed to have been erected by the Norsemen, hundreds of years before the

visit of Columbus to America. The United States naval training station, navy yard and torpedo station also are located at Newport.

The third day finds the tourist skirting the east shore of Narragansett bay, after crossing from the island of Rhode Island to Bristol by ferry. From Bristol may be seen Mt. Hope, where King Philip congregated his anti-English allies for the attack upon the Narragansett fort in 1675.

Itinerary No. 11 is reached at Providence, over which the return to Boston may be made, if desired. This tour follows the Blackstone valley to Worcester, Mass., and re-enters Boston over

Milton Low. Falls	7.4	7.4	121.8	East Falmouth..	2.5	74.0	86.6
Quincy	4.1	11.5	117.7	Falmouth	4.1	78.1	76.5
Hingham	6.2	17.7	111.5	West Falmouth..	4.1	82.2	72.4
Cohasset	6.6	24.3	104.9	North Falmouth..	3.3	85.5	69.1
Scituate Center..	3.6	27.9	101.3	Monument Beach	5.7	91.2	63.4
Greenbush	2.1	30.0	99.2	Buzzard's Bay ...	6.9	98.1	54.5
Marshfield	7.3	37.3	91.9	Onset	2.7	100.8	53.8
Kingston	8.6	45.9	83.3	East Wareham .	1.4	102.2	52.4
Plymouth	4.6	50.5	78.7	Wareham	2.6	104.8	49.8
Manomet	5.7	56.2	73.0	Marion	5.6	110.4	44.3
Sagamore	12.5	68.7	60.5	Mattapoisett	4.9	115.3	39.3
Sandwich	2.0	70.7	58.5	Fairhaven	5.1	120.4	34.3
West Barnstable	7.8	78.5	50.7	New Bedford	2.0	122.4	32.3
Barnstable	4.4	82.9	46.3	North Dartmouth	10.5	132.9	21.7
Yarmouthport ..	2.6	85.5	43.7	Fall River	3.1	136.0	18.6
Yarmouth	1.4	86.9	42.3	Tiverton, R. I. ...	6.2	142.2	12.4
Dennis	3.3	90.2	39.0	Newport	12.4	154.6	0.0
East Dennis	1.9	92.1	37.1	Newport-Boston, 123.6 Miles.			
Brewster	4.6	96.7	32.5			Total Miles	
East Brewster ..	1.6	98.3	30.9			Miles to Out Return	
Orleans	3.7	102.0	27.2	Newport	0.0	0.0	123.6
Eastham	4.0	106.0	23.2	Bristol Ferry	11.9	11.9	111.7
South Wellfleet .	6.6	112.6	16.6	Bristol	0.2	12.1	111.5
Wellfleet	2.3	114.9	14.3	Warren	4.2	16.3	107.3
North Truro	8.1	123.0	6.2				



Mt. Mansfield, in the Green Mountains of Northern Vermont, as Seen from the Neighboring Peak, Camel's Hump.

one of the three main macadam routes between those two cities. Good roads are encountered practically all of the way from Providence, the beautiful Blackstone valley being ideal touring ground.

ITINERARY NO. 23.

Night Stops — Boston and Provincetown,; Newport, R. I. Three days, 407.4 Miles.

Boston-Provincetown, 129.2 Miles.

	Miles to	Total Miles
	Out Return	
Boston	0.0	0.0 129.2

Provincetown-Newport, 154.6 Miles.

	Miles to	Total Miles
	Out Return	
Provincetown ...	0.0	0.0 154.6
North Truro ...	6.2	6.2 148.4
Wellfleet	8.1	14.3 140.3
South Wellfleet ..	2.3	16.6 138.0
Eastham	6.6	23.2 131.4
Orleans	4.0	27.2 127.4
Chatham	9.2	36.4 118.2
South Harwich ..	4.8	41.2 113.4
Harwichport	1.8	43.0 111.6
West Harwich ..	2.1	45.1 109.5
West Dennis ...	3.1	48.2 106.4
South Yarmouth .	0.8	49.0 105.6
West Yarmouth ..	3.2	52.2 102.4
Hyannis	2.0	54.2 100.4
Centerville	4.2	58.4 96.2
Osterville	2.9	61.3 93.3
Marston's Mills..	2.6	63.9 90.7
Waquoit	7.6	71.5 83.1

Barrington	1.6	17.9	105.7
East Providence..	7.7	25.6	98.0
Providence	2.6	28.2	95.4
Pawtucket	4.1	32.3	91.3
Lonsdale	2.7	35.0	88.6
Ashton	2.4	37.4	86.2
Woonsocket	7.3	44.7	78.9
Blackstone, Mass.	1.6	46.3	77.3
Uxbridge	7.2	53.5	70.1
Whitins	1.8	55.3	68.3
Northbridge	4.2	59.5	64.1
Farnumsville	2.2	61.7	61.9
Saundersville ...	1.5	63.2	60.4
Millbury	3.2	66.4	57.2
Worcester	6.0	72.4	51.3
Grafton	8.0	80.4	43.3
West Upton	4.6	85.0	38.6
Upton	1.2	86.2	37.4
Millford	5.5	91.7	31.9
West Medway ...	5.7	97.4	26.3
Millis	4.0	101.4	22.3
Medfield	3.0	104.4	18.3
Westwood	5.7	110.1	12.5
Dedham	2.9	113.0	10.6
Boston	10.6	123.6	0.0

IN THE GREEN AND WHITE MOUNTAINS.

Outward Trip Is Along the Connecticut Valley, Thence to Lake Champlain and Northward to Canadian Line, and Return by Way of Lake Sunapee.

A TOUR that is outlined to occupy five days and to visit the Connecticut valley, Lake Champlain, the mountains of northern Vermont and the White mountain region, is that outlined in itinerary No. 31. The start is made from Springfield, Mass., crossing the Connecticut river into West Springfield, where it is possible to view the old Day house, built in 1754, and the home of Capt. Day, who was active in organizing the so-called Shays' rebellion. The way then leads along the west bank of the river, past a number of large truck farms, into Holyoke, where opportunity may be had to study the paper producing industry.

Just beyond Holyoke is Mt. Tom, one of the highest peaks in that section, and a little further along, Mt. Holyoke raises its head across the river. Northampton is the seat of Smith College for girls, and there are a number of interesting drives in and about this city. A little further along is Sugar Loaf mountain, the scene of some of the bloodiest tragedies of the King Philip and later Indian wars. King Philip is said to have directed the movements of the western Indians from his headquarters on this mountain, and Table rock, a beetling cliff on the east side, has a seat cut in the side, which is called King Philip's chair.

In the northern part of South Deerfield is a monument on the Bloody Brook battlefield. Sept. 18, 1675, Capt. Lathrop and 84 men were conveying a train of grain wagons from ruined Deerfield to Hadley, and as they passed this brook they halted to rest and pick some luscious wild grapes which hung in clusters over its waters. While they were thus engaged 700 Indians fell upon them, and but seven men escaped.

Deerfield was sacked and burned and then abandoned shortly before this battle. Later it was settled again by a number of younger men, and in 1694 it was again attacked, although ably defended by the settlers, headed by their

pastor, Rev. John Williams. Feb. 29, 1704, a third attack was made, and this time the village was destroyed again, only one house remaining. One hundred and twelve captives were taken to Canada, where they were held for ransom. Memorial Hall contains an excellent collection of historical relics.

Soon after passing Greenfield, the route crosses the river again into East Northfield, the seat of the Moody School for girls, and of other institutions organized and perpetuated by Dwight L. Moody. Mt. Herman School for boys is situated only a short distance away.

Entering Vermont at Vernon is noted the magnificent dam across the river, which furnishes Brattleboro with a splendid lake front. The electricity generated at this dam furnishes light and power for numerous towns in northern Massachusetts, as far distant as Worcester. Brattleboro is naturally very beautifully situated and is the business centre for a large area in both Vermont and New Hampshire. The Estey organ works here are of especial interest.

In Putney are long strata of roofing slate, and the rare mineral, fluor spar, of a rich emerald green. In 1775, a strong timber fort was erected, which protected the settlement until the conquest of Canada made it unnecessary.

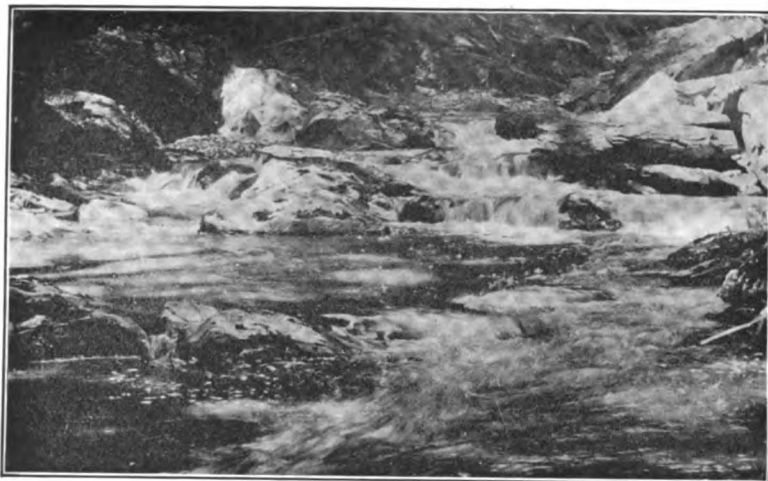
Bellows Falls was a favorite Indian resort, because of the large number of salmon and shad near its rapids. A short distance above the old bridge at this point are a number of hieroglyphics, which Schoolcraft decided were the records of an ancient battle. The river falls 42 feet within half a mile of the village, forming a white and impetuous rapids.

Charlestown, N. H., was settled by Massachusetts people and was originally named Number Four. Between 1746 and 1760, it was repeatedly attacked and conducted a defense so admirable that the enemy decided at last to abandon the conquest. During the later French and Indian wars it was a military station. It is situated between two broad, rich meadows, and has a long, wide, well shaded street.

Ascutney mountain comes into



When a Summer Breeze Stirs Up the Waters in St. Albans Bay, Vt.



One of the Many Gorges Worn by the Winooski River in Vermont.

view just above Claremont, and the river is recrossed into Vermont at Ascutneyville. At Windsor, during a heavy thunderstorm and with the news of the fall of Fort Ticonderoga ringing in their ears, the deputies of the Vermont towns adopted the state constitution, July 2, 1777. Ascutney, the name of the mountain, which is easily reached from Windsor, was Indian for Three Brothers, and is supposed to refer to the three singular valleys which run down its western slope. Early settlers claimed they often saw a curious light overhanging the peak at night. White River Junction is the night stop, at the union of the White and Connecticut rivers.

The second day, the route follows the picturesque White river for a time, branching off to climb the Green mountains toward Montpelier. Joseph Smith, founder of Mormonism, was born in Sharon. At Royalton, occurred the last attack by the Indians on New England in October, 1780. Two hundred redskins plundered and burned the village, as well as Sharon, and captured 27 of the people.

Bethel is a busy manufacturing village among high hills. A little further along is the famous Williamstown gulf, through which it is seldom indeed that cool breezes do not blow. The view from this point to Barre and Montpelier is most superb. The route from the capital of the state to Burlington is a reversal of a portion of tour No. 11.

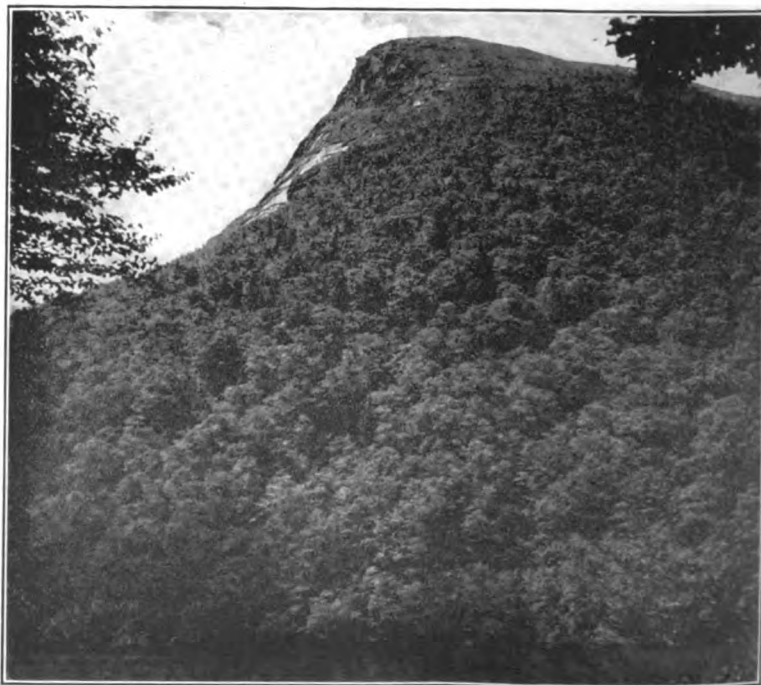
Near Winooski is the romantic canyon on the river, and at High

Bridge, the impetuous stream has cut a gorge through the solid rock 90 feet deep and 70 feet wide. St. Albans is the night stop, located on an elevated plain, three miles from Lake Champlain. A neat park of four acres in the centre of the city, is surrounded by hotels and numerous public buildings. A Norman-towered Episcopal church of red sandstone is most noteworthy. A magnificent view may be had from Aldis hill, about a mile to the northeast.

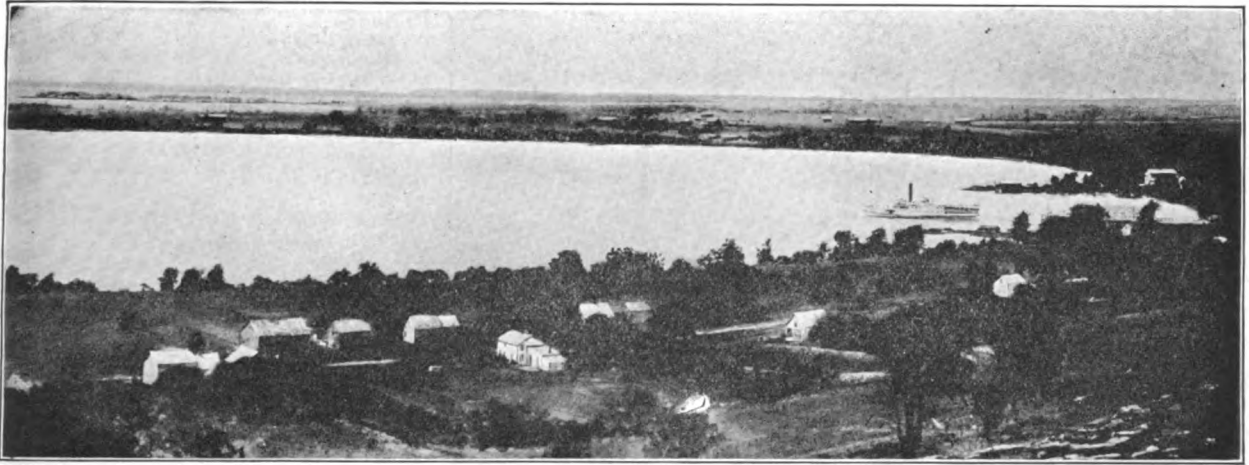
The third day takes the tourist first to Sheldon, near which are

located the famous mineral springs. That near the Missisquoi falls has had an enviable reputation. From Dunton's hill, a vast panoramic view of the Green mountains is obtained, while the silver waters of Lake Champlain, the Adirondacks and the spires of Montreal are to be included in the scene. At Richford, Jay peak rises to an altitude of over 4000 feet.

Newport is located at the upper end of Lake Memphremagog, and from the edge of the town rises Prospect hill, from which excellent lake views may be obtained. The lake is 30 miles long, and two-thirds of it lies in Canada. Barton Landing was the scene of much smuggling during 1810-15. At Barton, may be seen Crystal lake and the Flume, where a brook flows through a natural passage in the granite rock, 170 feet long, 10 wide and between 20 and 30 deep. The granite walls are smooth and perpendicular. In 1810, the people of Barton determined to widen Barton river by turning Long pond into it. They barely had completed a channel, when the waters burst through with tremendous force and swept down to Lake Memphremagog, wrecking everything in their path and causing immense damage. The bed of Long pond is now dry and



Where Mt. Cannon Overshadows Profile Lake at Its Base.



Enchanting View of St. Albans Bay, One of the Most Attractive Points on Lake Champlain.

is known as Runaway pond.

Numerous rare plants are to be found along the sides of Lake Willoughby, a magnificent sheet of water on the way to Lyndon and St. Johnsbury. Tour No. 11 is followed again for a short distance to the night stop at Bethlehem. The fourth day, return is made to Littleton, with its far-viewing heights, and then the tourist turns toward the Connecticut river, visiting Lisbon, somewhat noted for its gold mining, Bath with its picturesque glen, and Woodsville, on the way to Wells River, Vt.

Near Bradford is Devil's Den on the side of Wright's mountain, where one Wright, who claimed to be a prophet, lived the life of a hermit in a dismal rocky cleft. Fairlee is a hilly town abounding in pretty lakes, one of which is nearly three miles long. Mt. Cuba and Mt. Sunday cast their reflection upon these waters. Cuba falls and the perpendicular cliffs of gray granite on Sawyer's mountain are worthy of special notice.

North Thetford produces much copper ore, which is sent overland to Portsmouth, N. H., thence to Baltimore by ship. Below Thetford distant views of Moosilauke and Bald mountains are to be had. Hanover is the seat of Dartmouth College, founded in 1770 as a school for Indians. At first it had 24 students, domiciled in huts built of green logs, situated in the midst of a vast wilderness. At West Lebanon is the Tilden Ladies' Seminary, whose fine buildings are seen on a hill.

In the vicinity of Mascomy lake,

near Enfield, is a community of Shakers, which has furnished much fine wood and wooden ware for the market. Lebanon is a pretty manufacturing village on an elevated plain near Mascomy falls. Croydon is noted for its splendid granite quarries.

The night stop is at Sunapee, and the morning of the fifth day finds the tourist reversing a portion of tour No. 21 to Keene. On the way to Hinsdale a splendid outlook over the new dam of the Connecticut River Company is afforded. After crossing the state line into Massachusetts the Moody schools at Northfield and East Northfield, may be visited. Then comes the Massachusetts Agricultural College at North Amherst and Amherst College at Amherst. Just above Moody's Corner the road enters a narrow gorge be-

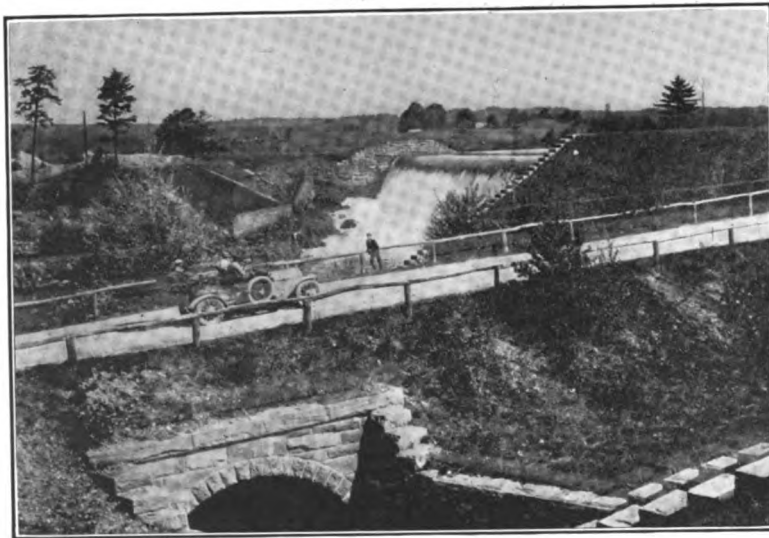
tween two mountains of the Holyoke range, and from this point the views of Mt. Holyoke and Mt. Tom are such as to hold particular interest.

Time should be taken at South Hadley to visit the campus of Mt. Holyoke College for gifts, concerning the fantastic beauty and sublime majesty of which much has been written. The surroundings at the college are especially pleasing, and the grove frequently is utilized as an outdoor theatre for the presentation of Shakespearian plays and similar productions.

Chicopee, at the confluence of the Chicopee and Connecticut rivers, is the home of the Ames foundry, in which the superb bronze doors of the United States Senate chamber at Washington, were cast during the Civil War.



Mt. Holyoke, Across the Connecticut from Smith's Ferry.



Where the Chicopee River Empties into the Connecticut.

ITINERARY NO. 31.

Night Stops — Springfield, Mass.; White River Junction and St. Albans, Vt.; Bethlehem and Sunapee, N. H. Five Days, 591.2 Miles.

Springfield-White River Junction, 123.2 Miles.

	Miles to	Total Miles
	Out	Return
Springfield	0.0	0.0 123.2
West Springfield	1.3	1.3 121.9
Holyoke	0.3	8.6 114.6
Smith's Ferry	3.9	12.5 110.7
Mt. Tom	2.1	14.6 108.6
Northampton	2.4	17.0 106.2
South Deerfield	11.5	28.5 94.7
Deerfield	5.1	33.6 89.6
Greenfield	3.4	37.0 86.2
Barnardston	6.6	43.6 79.6
Guilford, Vt.	11.0	54.6 68.6
Brattleboro	2.6	57.2 66.0
Putney	9.5	66.7 56.5
Westminster	8.3	75.0 48.2
Bellows Falls	5.1	80.1 43.1
N. Walpole, N. H.	0.6	80.7 42.5
S. Charlestown	2.9	83.6 39.6
Charlestown	4.8	88.4 34.8
N. Charlestown	5.8	94.2 29.0
Claremont	5.0	99.2 24.0
Acuteville, Vt.	4.5	103.7 19.5
Windsor	4.8	108.5 14.7
Hartland	4.7	113.2 10.0
West Hartland	4.5	117.7 5.5
White River Junction	5.5	123.2 0.0

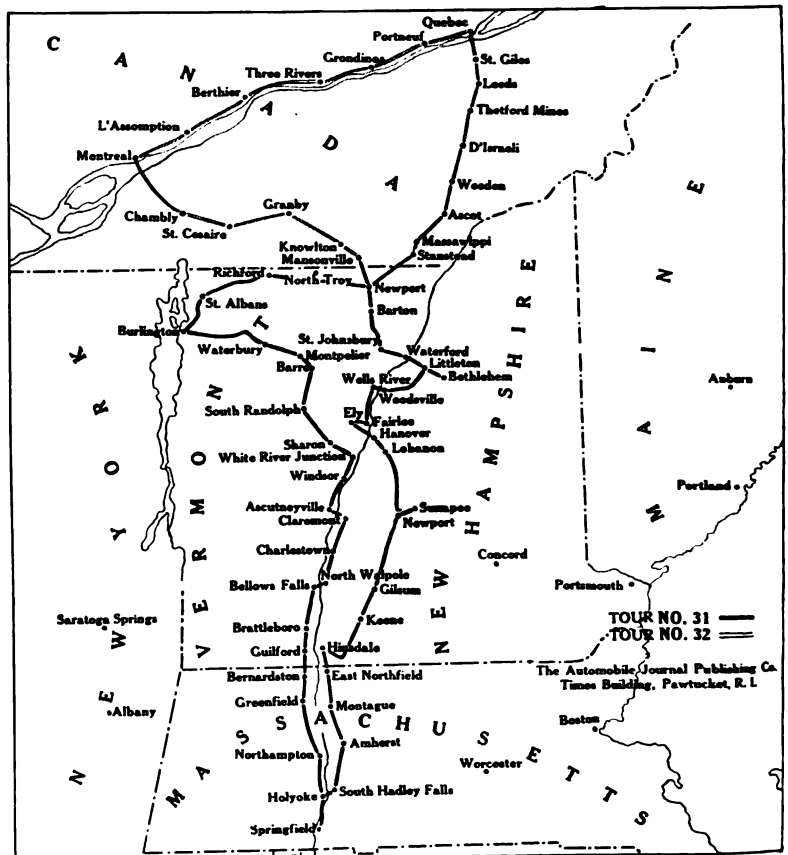
White River Junction—St. Albans, 125.5 Miles.

	Miles to	Total Miles
	Out	Return
White River Junction	0.0	0.0 125.5
Hartford	1.6	1.6 123.9
West Hartford	5.5	7.1 118.4
Sharon	6.2	13.3 112.2
South Royalton	4.0	17.3 108.2

Bolton	7.7	77.9	47.6
West Bolton	1.9	79.8	45.7
Richmond	4.6	84.4	41.1
Williston	5.2	89.6	35.9
Burlington	8.0	97.6	27.9
Winoski	2.8	100.4	25.1
Colchester Center	5.0	105.4	20.1
Milton	7.3	112.7	12.8
Georgia	6.7	119.4	6.1
St. Albans	6.1	125.5	0.0

St. Albans-Bethlehem, 125.3 Miles.

	Miles to	Total Miles
	Out	Return
St. Albans	0.0	0.0 125.3
Sheldon	9.8	9.8 115.5
North Sheldon	3.3	13.1 112.3
Enosburg Falls	5.4	18.5 106.9
North Enosburg	4.1	22.6 102.7
East Berkshire	1.4	24.0 101.3
Richford	4.8	28.8 96.5
East Richford	5.5	34.3 91.0
North Troy	11.5	45.8 79.5
Newport Center	6.5	52.3 73.0
Newport	6.0	58.3 67.0
East Coventry	5.0	63.3 62.0
Coventry Depot	1.5	64.8 59.5
Barton Landing	4.5	69.3 54.0
Barton	5.0	74.3 49.0
Glover	3.5	77.8 45.5
Sheffield	9.0	86.8 36.5
Wheelock	1.5	88.3 35.0
Lyndon Center	5.0	93.3 30.0
St. Johnsbury Center	6.0	99.3 24.0
St. Johnsbury	3.0	102.3 21.0
Gaskill	6.0	108.3 15.0
Lower Waterford	4.0	112.3 11.0
Waterford	3.0	115.3 8.0
Littleton, N. H.	5.0	120.3 3.0
Bethlehem	5.0	125.3 0.0



Bethlehem-Sunapee, 103.6 Miles.

	Miles to	Total Miles	Out Return
Bethlehem	0.0	0.0	103.6
Littleton	5.0	5.0	98.6
South Littleton..	5.4	10.4	93.2
North Lisbon ...	1.7	12.1	91.5
Sugar Hill	3.4	15.5	88.1
Lisbon	2.1	17.6	86.0
Bath	5.7	23.3	80.3
Woodsville	5.5	28.8	74.8
Wells River, Vt..	0.6	29.4	74.2
Newbury	4.9	34.3	69.3
Bradford	7.4	41.7	61.9
Fairlee	6.5	48.2	55.4
Ely	2.9	51.1	52.5
North Thetford..	2.7	53.8	49.8
Thetford	2.3	56.1	47.5
Hanover, N. H...	9.5	65.6	38.0

West Lebanon ..	3.9	69.5	34.1
Lebanon	3.8	73.3	30.3
Grantham	14.2	87.5	16.1
Croydon	3.3	90.8	12.8
Croydon Flats...	3.5	94.3	9.3
Newport	3.7	98.0	5.6
Guild	2.4	100.4	3.2
Sunapee	3.2	103.6	0.0

Sunapee-Springfield, 113.6 Miles.

	Miles to	Total Miles	Out Return
Sunapee	0.0	0.0	113.6
Guild	3.2	3.2	110.4
Newport	2.4	5.6	108.0
Mill Village	4.7	10.3	103.3
East Lempster...	6.1	16.4	97.2
Marlboro	8.9	25.3	88.3
Gilsom	7.1	32.4	81.2

Keene	8.1	40.5	73.1
West Swansey ..	5.3	45.8	67.8
Westport	2.4	48.2	65.4
Winchester	5.3	53.5	60.1
Ashuelot	3.5	57.0	56.6
Hinsdale	2.4	59.4	54.2
East Northfield,			
Mass.	6.5	65.9	47.7
Northfield	0.6	66.5	47.1
Millers Falls ...	9.0	75.5	38.1
Lake Pleasant ..	3.4	78.9	34.7
Montague	0.8	79.7	33.9
North Amherst ..	9.4	89.1	24.5
Amherst	2.5	91.6	22.0
Moody's Corner..	8.4	100.0	13.6
South Hadley...	0.9	100.9	12.7
S. Hadley Falls..	3.1	104.0	9.6
Holyoke	0.7	104.7	8.9
Williamset	1.2	105.9	7.7
Chicopee	3.8	109.7	3.9
Springfield	3.9	113.6	0.0

THREE DAYS IN THE DOMINION OF CANADA.

Outlining a New Route Between the States and the City of Quebec, with a Splendid Trip up the Valley of the St. Lawrence to Montreal.

THE three-day trip outlined in tour No. 32 is a substitute for the better known route between Quebec and the States by way of Jackman, Me., and is suggested as a continuation to itinerary No. 52 at Montreal. The starting point is at Newport, Vt., and the night stops, Quebec and Montreal.

The customs formalities must be arranged at Stanstead, a short distance from Lake Memphremagog. Several picturesque lakes are viewed on the way, including Massawippi, near the town of that name; Noir, near Marbleton; Weeden, near Weeden; Aylmer, at Garthby; Francis, at D'Israeli; Clapham and Marie, between Thetford Mines and Robertson. Marbleton is noted for its marble quarries and lime pits, while at Thetford Mines are located the largest asbestos deposits in the world. Bell mine has an area of several acres and is 150 feet deep.

The final portion of the drive into Quebec is exceedingly picturesque. Beyond Leeds, Parkhurst and St. Giles, the road winds along the bank of the Beauvoir river to the St. Lawrence. The city is entered over the magnificent Quebec bridge, which is said to be the largest single span bridge in the world, and the tourist is thus spared the necessity for using the ferry, which was utilized for so many years.

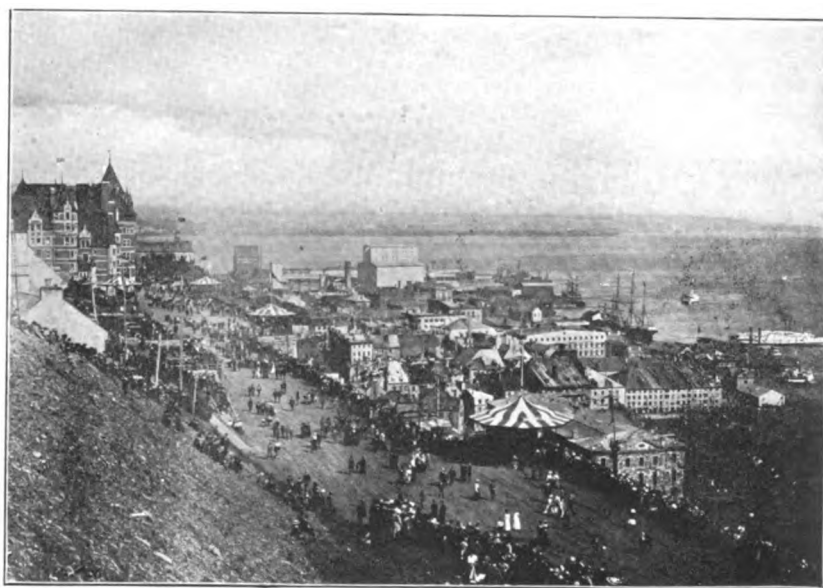
Quebec is filled with historic in-

terest. In many respects it is the most quaint and picturesque city on the American continent. Of the many side trips, the following may be mentioned: Ste. Anne de Beaupre, where thousands of pilgrims annually visit the relics for miraculous cures; the falls of Ste. Anne and those of Ste. Fereol, still further to the east; Lake Beauport, Indian Lorette, and Cap Rouge.

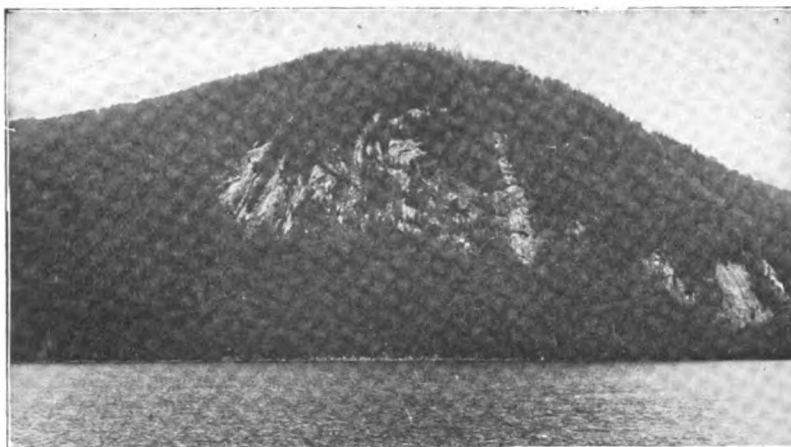
The view of Quebec from the St. Lawrence in the early morning is said to be a sight never to be forgotten. Above the city the river

flows between the Laurentian mountains. Then the tour passes Lake St. Peter, where the St. Lawrence broadens out on the lowlands. Among the features of this body of water are the lumber rafts on which are carried the rude huts of the lumbermen. At various points along the route, quaint old towns are passed, in which the people, like those during the previous day's drive, speak French for the most part, and many old-world characteristics are noted.

Montreal is the metropolis of



General View of a Portion of Quebec Overlooking the St. Lawrence.



Mt. Hor Raises Its Head Above Willoughby Lake, West Burke, Vt.

the Dominion of Canada and is termed "the Queen of the St. Lawrence." It is one of the most beautiful cities on the continent of North America, and has a history dating from 1535, in which year Jacques Cartier visited the triple-walled Indian village of Hochelaga and ascended the lofty hill beside it, which from the beauty of its view he named Mount Royal.

Chambly, reached early the third day, was fortified by the French in 1711, and in 1775 it had a strong stone fort, erected by the British. The town is situated on a lake-like expansion of the Richelieu river, known as the Chambly basin, and the Chambly rapids are nearby. Knowlton is at the foot of Brome lake, with Brome mountain about 10 miles distant, although in full view. At South Bolton, the tour goes through the Bolton notch, with excellent views along the way. Customs arrangements may be perfected at Man-

sonville. The return to Newport from this point is along the shore of Lake Memphremagog with excellent views of Owl's Head.

ITINERARY NO. 32.

Night Stops—Newport, Vt.;
Quebec and Montreal, Can.
Three Days, 467.3 Miles.

Newport-Quebec, 177.8 Miles.

	Miles to	Total Miles
	Out	Return
Newport	0.0	177.8
Derby	5.1	172.7
Stansstead, Que... 5.9	11.0	166.8
Cassville	6.1	160.7
Massawippi	12.4	148.3
Lennoxville	10.2	138.1
Ascot	15.5	122.6
South Dudswell... 2.2	57.4	120.4
Marbleton	9.4	66.8
Weeden	8.9	75.7
Garthby	10.9	86.6
D'Iraell	5.1	91.7
Coleraine	5.8	97.5
Thetford Mines... 10.7	108.2	69.6
Robertson Station 5.2	113.4	64.4

Reedham	1.9	115.3	62.5
Kinnear's Mills... 8.5	123.8	54.0	
Leeds	6.2	130.0	47.8
Parkhurst	9.8	139.8	38.0
St. Gilles	8.6	148.4	28.4
St. Etienne	11.9	160.3	17.5
Chaudiere	5.3	165.6	12.2
Levis	7.9	173.5	4.3
Quebec	4.3	177.8	0.0

Quebec-Montreal, 186.7 Miles.

	Miles to	Total Miles
	Out	Return
Quebec	0.0	186.7
St. Augustin	14.3	172.4
Les Ecureuils	14.2	28.5
Cap Santo	4.3	32.8
Portneuf	5.1	37.9
Deschambault	4.2	42.1
La Chevrotierre... 4.8	46.9	139.8
Gronclines	2.3	49.2
St. Ann de la Per-		
ade	8.8	58.0
St. Genevieve	9.1	67.1
Champlain	8.9	76.0
Bonadventure	9.7	85.7
Three Rivers	4.1	89.8
Pointe du Lac	8.9	98.7
Yamachiche	8.3	107.0
Louville	7.0	114.0
Maskinonge	7.1	121.1
St. Cuthbert	9.8	130.9
Berthier	4.4	135.3
Lanorale	9.2	144.5
Lavaltry	6.1	150.6
St. Sulpice	5.7	156.3
L'Assomption	5.2	161.5
Charlemagne	8.7	170.2
Longue Point.... 9.6	179.8	6.9
Montreal	6.9	186.7

Montreal-Newport, 102.8 Miles.

	Miles to	Total Miles
	Out	Return
Montreal	0.0	102.8
Longueuil	3.0	99.8
St. Hubert	5.0	94.8
Chambly	8.9	85.9
Marleville	6.0	79.9
Rougemont	6.2	73.7
St. Censire	3.3	70.4
Abbotsford	6.8	63.6
Granby	8.4	55.2
Waterloo	11.9	43.3
Knowlton	9.6	33.7
South Bolton	9.8	23.9
Mansonville	8.4	15.5
Newport Center,		
Vt.	9.4	96.7
Newport	6.1	102.8

TOURING AMONG THE BERKSHIRE HILLS.

Itinerary Gives Two Routes Between Boston and Albany, Affording Connection with New England from the West—Particularly Attractive in the Autumn.

THOSE who enjoy the beauties of touring in the autumn, with all the kaleidoscopic colorings in the foliage of hill and dale, will appreciate the itinerary outlined herein. It is designed to connect Boston and Albany over two distinct routes, one of which, the outward trip, offers some slight deviations from the beaten path, while the other presents

some of the best roads in the country in combination with many rich views of the Berkshires and the Connecticut valley. It is anticipated that the tourist will be on the road four days, with night stops at Greenfield, Mass.; Albany, N. Y., and Springfield, Mass.

After passing through Watertown, the site of the Massachusetts arsenal, and Waltham, the

home of the Waltham watch, the tourist enjoys a pleasant drive through Maynard and Stow, and emerges from this first glimpse of country beauty to visit Fitchburg, another manufacturing city of importance. At Gardner is the largest chair factory in the world. Excellent automobile roads lead through Otter River, Baldwinville and Athol to Orange, and

then the descent into the Connecticut valley is begun. At Millers Falls, Mt. Toby and its base, and Lake Pleasant divide attention with the river. Greenfield is the night stop.

Soon after leaving Greenfield, the second day, the way leads up Shelburne mountain, and then into the valley of the Deerfield at Shelburne Falls, the early home of William Cullen Bryant, Charles Dudley Warner and several other people of note. At Charlemont, a view of the \$20,000,000 Hoosac tunnel is obtained, and while the shorter distance to North Adams is over Hoosac mountain, a detour is made at this point, entering Vermont, through most interesting scenery, albeit, the roads are far from ideal in places. It is anticipated, however, that the tourist will find less difficulty in covering these country ways than in climbing the mountain and descending the many winding curves and heavy grades on the other side.

North Adams is in the shadow of Mt. Greylock, and about a mile north of the city is the famous natural bridge over Hudson's brook. The cascade in Notch brook is another pretty little spot half hidden away in a glen. After leaving Williamstown, the seat of Williams College, the way leads back into Vermont, through Pownal, and thence into New York State at North Petersburg, passing near Walloomsac, where was fought the battle of Bennington. A few country villages, with their quaint old houses are next passed, and the road descends into the valley of the Hudson on the way to Troy and Albany.

Albany, the capital of New York, is full of interest. Chief among the buildings of prominence is the state house, built at an enormous cost and filled with relics of all the wars. Two other structures of note are the Catholic and Episcopal cathedrals. Van Rensselaer Manor House and its park, on the site first occupied by Killan Van Rensselaer, patroon of Beverwyk, also should be visited for its historic associations.

On the return trip the road leads over the hills to Pittsfield, passing through the Lebanons, a series of Shaker settlements. Pittsfield is admirably situated among the Berkshires, with a

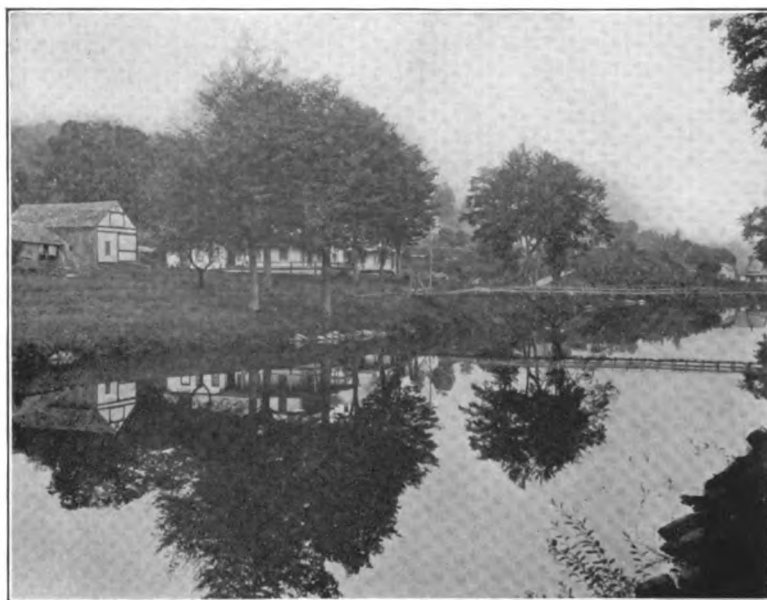
number of little lakes and several interesting mountains nearby. Lenox is described as "a gem among the mountains," and is the summer home of numerous people of prominence.

Lee was settled in 1760, and was named for one of the Virginia Lees. It is famed for its wonderful white marble, of which some \$1,000,000 worth was employed in the erection of the capitol at Washington. Becket has several lakes, from one of which the Farmington river flows down into Connecticut. The route to Becket is over the famous Jacob's Ladder, now placed in excellent condition, through agitation aroused by motorists.

Chester, Huntington and Rus-

Springfield, the night stop, is known as the City of Homes. It is a centre from which a number of motoring trips may be made in all directions. From the United States armory on State street it is possible to secure a view up and down the valley, which is unequalled anywhere in this country, and which is considered by many to be superior to the like views afforded in European countries.

From Springfield to Boston the road is macadam nearly all the way. Palmer also is famous for its scenery, combining woods and hills, the lesser mountains, lakes and rivers. Warren is a pretty manufacturing town amid roundling hills. Of West Brookfield it



The Mirror in the River at South Londonderry, Vt.

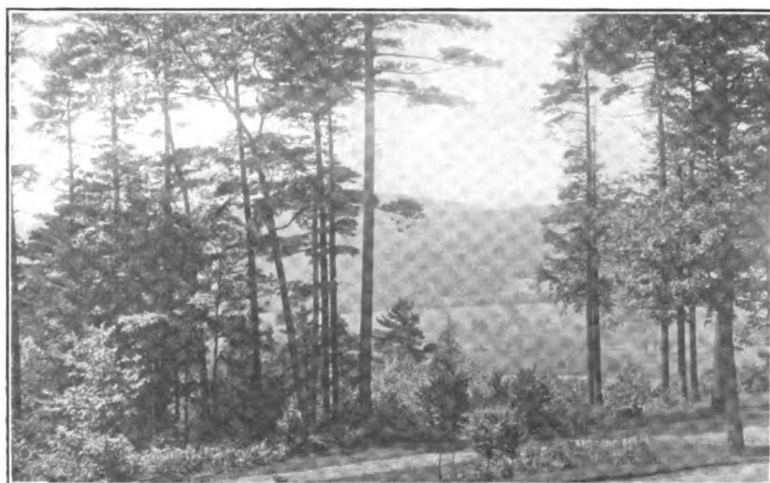
sell are all pretty Berkshire towns, and then the way dips down into the Connecticut valley, through the Indian domain of Woronoco, settled in 1660 by the English and called Streamfield. The Little River water works of the City of Springfield are near this town.

Late in King Philip's war the people of Westfield were ordered to evacuate and concentrate with those of the other settlements in the valley at Springfield and Hadley. An angry refusal was returned and for a time negotiations were under way looking toward a union with Connecticut. Later the legislature found it desirable to cancel the order.

is stated that it produces apples and boots, and the orchards are of particular interest in the fall of the year.

In Brookfield time should be taken to visit the garrison house, in which for three days the settlers held out against a superior force of Indians. As a last resort the redskins backed a load of blazing flax and straw near it in an effort to burn it down. A sudden shower put out the flames, and the incident was regarded by both sides to the conflict as miraculous.

Spencer was the native town of Elias Howe, Jr., the inventor of the sewing machine. Then



Pleasing View of the Berkshires on the Way from Pittsfield to Lenox.

comes Worcester, the Heart of the Commonwealth, well and favorably known by motorists. The remainder of the distance into Boston is through Shrewsbury, Northboro, Marlboro (the so-called "boro" towns), Wayland and Weston.

Shrewsbury was the birthplace of Levi Pease, who started the first line of mail stages between Boston and New York in 1784, previous to which fortnightly mail was carried between these two cities in saddle bags. Northboro is devoted to cattle raising. Marlboro was the site of the Christian Indian village of Okammakemessitt. Each is filled with particular interest to the tourist.

In every respect this itinerary offers an ideal autumn tour. The Berkshires are at their very best during this season, and the two routes through them leave nothing to be desired. For those who have ample time at their disposal it would be possible to make North Adams, Pittsfield or Becket the headquarters for a more extended stay in their environs, with plenty of opportunity to enjoy nature at its prettiest.

ITINERARY NO. 34.

Night Stops — Boston and Greenfield, Mass.; Albany, N. Y.; Springfield, Mass.
Four Days, 392.7 Miles.

Boston-Greenfield, 97.2 Miles.

	Miles to	Total Miles	Out Return
Boston	0.0	0.0	97.2

Watertown	6.8	6.8	90.4
Waltham	2.8	9.6	87.6
Hastings	3.0	12.6	84.6
Maynard	9.8	22.4	74.8
Stow	2.8	25.2	72.0
Bolton	5.9	31.1	66.1
Leominster	10.1	41.2	56.0
Fitchburg	4.8	46.0	51.2
Westminster	7.2	53.2	44.0
South Gardner	3.8	57.0	40.2
Gardner	0.8	57.8	39.4
Otter River	4.6	62.4	34.8
Baldwinsville	1.3	63.7	33.5
Athol Center	8.7	72.4	24.8
Athol	1.1	73.5	23.7
Orange	4.7	78.2	19.0
Wendell	2.7	80.9	16.3
Irving	2.4	83.3	13.9
Millers Falls	6.3	89.6	7.6
Turners Falls	4.4	94.0	3.2
Greenfield	3.2	97.2	0.0

Greenfield-Albany, 106.7 Miles.

	Miles to	Total Miles	Out Return
Greenfield	0.0	0.0	106.7

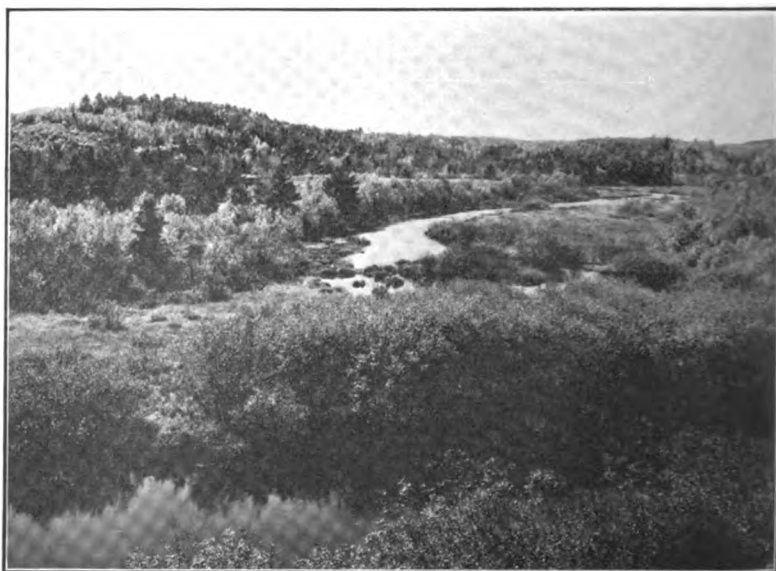
Shelburne	5.4	5.4	101.3
Shelburne Falls	4.0	9.4	97.3
Charlemon	8.3	17.7	89.0
Readsboro, Vt.	17.8	35.5	71.2
Heartswellville	8.5	44.0	62.7
Stamford	7.2	51.2	55.5
Bridgeville	2.6	53.8	52.9
N. Adams, Mass.	2.2	56.0	50.7
Williamstown	5.4	61.4	45.3
Pownal, Vt.	4.7	66.1	40.6
North Pownal	3.4	69.5	37.2
North Petersburg, N. Y.	3.7	73.2	33.5
Potter Hill	5.9	79.1	27.6
Boylstonville	3.2	82.3	24.4
Pittstown	2.2	84.5	22.2
Raymertown	3.1	87.6	19.1
Center Brunswick	6.1	93.7	13.0
Troy	4.7	98.4	8.3
Albany	8.3	106.7	0.0

Albany-Springfield, 93.7 Miles.

	Miles to	Total Miles	Out Return
Albany	0.0	0.0	93.7
Rensselaer	1.0	1.0	92.7
East Greenbush	4.5	5.5	88.2
Schodack Center	1.7	7.2	86.5
Nassau	5.6	12.8	80.9
West Lebanon	8.9	21.7	72.0
New Lebanon Center	2.6	24.3	69.4
New Lebanon	1.7	26.0	67.7
Shaker Village, Mass.	6.0	32.0	61.7
Pittsfield	4.7	36.7	57.0
Lenox	6.6	43.3	50.4
Lee	4.0	47.3	46.4
East Lee	2.4	49.7	44.0
West Becket	5.8	55.5	38.2
Becket Center	2.2	57.7	36.0
Bonnyrigg Four Corners	3.1	60.8	32.9
Chester	4.3	65.1	28.6
Huntington	7.1	72.2	21.5
Russell	3.9	76.1	17.6
Woronoco	2.9	79.0	14.7
Westfield	5.6	84.6	9.1
West Springfield	7.4	92.0	1.7
Springfield	1.7	93.7	0.0

Springfield-Boston, 95.1 Miles.

	Miles to	Total Miles	Out Return
Springfield	0.0	0.0	95.1



The Otter River Meadows in the Vicinity of Otter River, Mass.

North Wilbraham 10.3	10.3	84.8	Spencer	6.8	40.0	55.1	Northboro	4.4	61.0	34.1
Palmer	5.3	15.6	Leicester	5.0	45.0	50.1	Marlboro	5.6	66.6	28.5
Warren	11.4	27.0	Cherry Valley	1.8	46.8	48.3	Wayland	10.8	77.4	17.7
West Brookfield ..	3.4	30.4	Worcester	4.2	51.0	44.1	Weston	3.4	80.8	14.3
Brookfield	2.8	33.2	Shrewsbury	5.6	56.6	38.5	Boston	14.3	95.1	0.0

VACATION SPOTS ON LONG ISLAND.

Tour First Visits Litchfield Hills and Housatonic Valley and Contemplates a Whole Day Among the Beauties of the Island Before Returning to Hartford.

FAMED as are the mountains, lakes and rivers of New England, it must not be denied there are numerous vacation spots in these states that are not so well known as their beauty would warrant. The same will hold true with respect to Long Island. And while this latter ground is more or less familiar to tourists from New York City, there are many motorists who have never taken the time to explore its resources.

In the accompanying itinerary, it is anticipated that three days will be devoted among the lesser known portions of this section. The start is made from Hartford, Conn., and the tour first reaches the Litchfield hills, and crosses Long Island sound for a day on the island itself, before returning to the capital of the Nutmeg State over ways perhaps somewhat better known.

Leaving Hartford, Farmington is the first interesting place reached. The town occupies a beautiful situation on the banks of the river of the same name. A broad and shaded street two miles long, practically composes the village. It was settled in 1640, and it was here that the village pastor preached to the Continental army on its march to Boston in 1775.

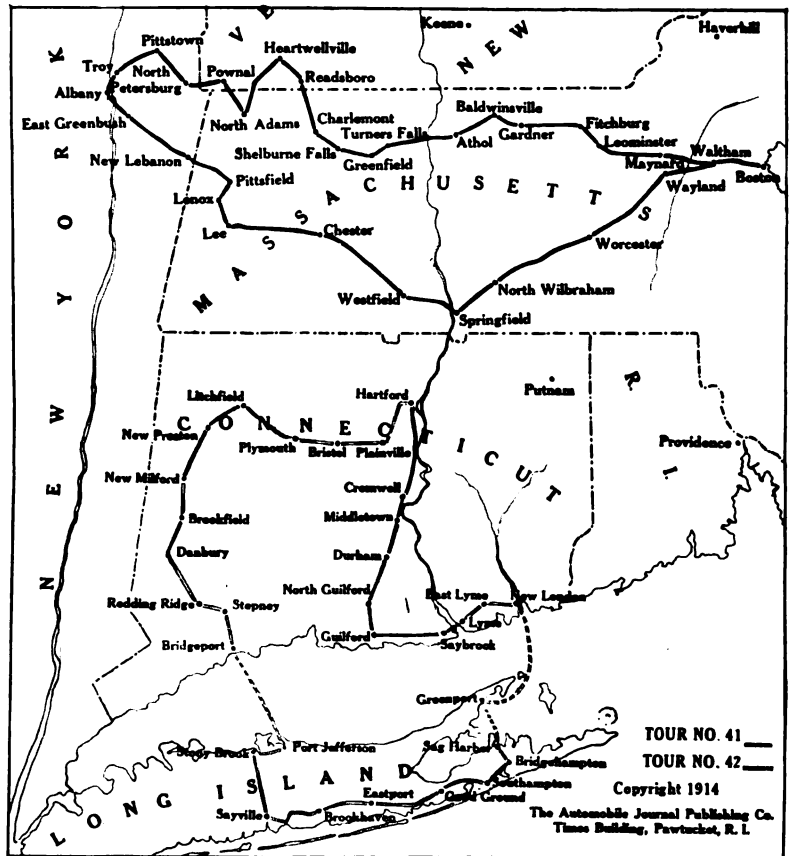
Plainville, with its macadam ways, Forestville, and Bristol follow in quick succession. The tourist is now in the centre of the original clock making industry in America. Eli Terry began the manufacture of these goods in a small shop in Terryville, but the business very soon spread to Bristol and Thomaston, both of which have been producing clocks for many years. Just before reaching the latter town, the route leads

down a very steep hill, practically one mile long, although a detour may be taken if deemed advisable.

Northfield is a knife making centre, much of the cutlery being hand forged; the material is imported steel from Sheffield, Eng., whence many of the employees came. The road from this point

district known as Litchfield hills.

Litchfield occupies an interesting place in history. The first law school in America was opened in a small building which is shown visitors with justifiable pride. During the summer months, the hill top is the favorite home for many New York people, and Bantam lake, only a few miles distant, and



to Litchfield is nearly all up grade, and as the hills are climbed new scenes unfold themselves in rapid succession, and while the so-called mountains are small of stature the car finds much less difficulty in making the grades than would be the case in other portions of the

distinctly visible from many points, lends an added charm.

This lake is passed on the way to Bantam and New Preston. Just beyond the former town the road takes a dip between two high hills, one of which is known locally as Mt. Tom. New Preston commands

a pleasing view of the surrounding country and easily explains the attractiveness of the section. Here, time should be taken to drive about Lake Warramaug, a splendid boulevard making this possible without difficulty.

New Milford is near the junction of the Housatonic and Aspetuck rivers, with a wide verdant park and well shaded trees. Nearby is a silver mine, which was worked prior to 1790, and the town is one of the centres of the tobacco trade in the valley. The way then leads along the Housatonic to Brookfield and beyond,

The harbor at the latter place is conceded to be one of the most beautiful on the sound. The town is built up on terraces, which extend back from the water's edge in pleasing array, the many hued trees lending their charm to the situation.

The second day soon finds the tourist at St. James, in which is located the summer estate of the late Mayor Gaynor of New York City, Deepwells. A drive through pretty woodland leads to an arm of Lake Ronkonkoma, the terminus of the Long Island Motor Parkway. About this lake are

shore of the island at Bayport. The way turns eastward along this shore to Sag Harbor and Greenport. Boats leave Sag Harbor for New London at 6 in the morning, at 12:30 in the afternoon, and Greenport at 6:30 and 1:40. The tourist has the option of remaining on the island or crossing to the mainland, depending largely upon the time he arrives at these places.

The third day leaves New London behind to enjoy the beauties of the Connecticut shore. The route is over the main line to New York for some distance, crossing



In the Naugatuck Valley, Near Thomaston, Conn., with the Litchfield Foothills on Either Side.

and finally reaches Danbury, the home of the hat industry.

From this point to Bridgeport the road is most direct. Stop may be made to visit Putnam Park, established in memory of Israel Putnam. If desired the boat across the sound may be taken in the evening. The ferry is operated only twice daily, at 1:30 and 6:30 in the afternoon. Should the tourist elect to remain over night in the Park City, abundant opportunity may be had to explore the vicinity before taking the first boat to Port Jefferson the morning of the following day.

numerous little coves and streams which form a perfect outline of a pair of spectacles. The lake itself has baffled government geologists in their efforts to learn why this body of fresh water should have a tide which rises and falls every seven years. It has no direct connection with the sound, the ocean or any other tidewater, and its actual depth is not known.

Then comes Bread and Cheese hollow and the headwaters of the Nissequogue river, the happy hunting grounds of the Long Island Indians. And finally the motorist finds himself on the opposite

the Connecticut river on the new bridge between Lyme and Saybrook. Of course, the return to Hartford may begin at Saybrook, following the better known Connecticut valley road, but it is anticipated that the trip will be undertaken for the purpose of exploration, and the itinerary as outlined from Guilford will be found fully as enjoyable.

Lyme is a venerable hamlet, half buried in foliage, its Main street lined with old trees and historic mansions, among the latter being Black Hall, the home- stead of the patrician Griswolds.



Distinctive Beach Scene on the Connecticut Shore of Long Island Sound.

Westbrook and Clinton, are two quiet towns on the shore, much frequented by summer people, because of the absence of the trolley and other disturbing seaside factors. Madison is almost equally known in this respect.

Guilford was settled in 1639 by four immigrants from Kent and Surrey, England, its former Indian name being Menuncatuck. During the extermination of the Pequots by the Mohegans, a few years previous to this time, the sachem, Uncas, had his headquarters at this point and numerous battles were fought in this vicinity. In 1781 the regicides were hidden in an old house which still stands. Three frigates landed a force which marched through the streets during this period, but the rapidly gathering militia drove them off, before the fugitives were located.

North Guilford is somewhat isolated from the surrounding country and offers abundant opportunity to witness the quaint and beautiful. The sound may be seen at intervals, but the motorist's attention is much more likely to be taken up by the interesting bits of woodland scenery, which continue through Bluff Head, from which point pleasing outlooks upon the Connecticut river may be had. Middletown is the seat of Wesleyan University and the view from the tower of the old chapel is considered by many as unequalled

throughout this district.

After leaving Middletown, the road follows the river through Cromwell, Rocky Hill and Wethersfield. This is a favorite drive for Hartford motorists and is almost too well known to need comment. Rocky Hill is so named because of its trap rock and sandstone ledges, and commands an interesting view of the river toward the north, clear weather making it possible to discern the outlines of Mts. Tom and Holyoke on either side of the Connecticut river valley, in Massachusetts, many leagues away.

ITINERARY NO. 42.

Night Stops—Hartford and Bridgeport, Conn.; Greenport, L. I. Three Days, 256.4 Miles.

Hartford-Bridgeport, 94.1 Miles.

	Miles to	Total Miles Out Return
Hartford	0.0	0.0 94.1
West Hartford ..	3.7	3.7 90.4
Farmington	5.5	9.2 84.9
Plainville	4.6	13.8 80.3
Forestville	2.1	15.9 78.2
Bristol	2.4	18.3 75.8
Terryville	3.9	22.2 71.9
Plymouth	2.2	24.4 69.7
Thomaston	1.0	25.4 68.7
Northfield	2.7	28.1 66.0
Litchfield	6.0	34.1 60.0
Bantam	4.1	38.2 55.9
New Preston	8.1	46.3 47.8
Northville	3.3	49.6 44.5
New Milford	4.3	53.9 40.2
Still River	2.8	56.7 37.4
Brookfield	5.0	61.7 32.4
Danbury	7.3	69.0 25.1
Bethel	3.1	72.1 22.0
Redding Ridge ..	6.5	78.6 15.5
Stepney	0.8	85.4 8.7
Bridgeport	8.7	94.1 0.0

Bridgeport-Greenport, 87.8 Miles.

	Miles to	Total Miles Out Return
Bridgeport	0.0	0.0 87.8
E. Setauket, L. I. ..	1.8	1.8 86.0
Stony Brook	3.5	5.3 82.5
St. James	2.3	7.6 80.2
Neaconssett	4.9	12.5 75.3
Sayville	9.4	21.9 65.9
Bayport	1.5	23.4 64.4
Blue Point	1.7	25.1 62.7
Patchogue	1.8	26.9 60.9
Belleport	4.3	31.2 56.6



Connecticut Valley Supplies Beautiful Mountain and River Scenery.



A Glimpse of the Mountains on the Way to Manchester, Vt.

romantic pass known as Stratton gap.

The state seal of Vermont had its origin in Arlington, in which town are the West and Red mountains. The way leads down the valley of the Battenkill to Cambridge, N. Y. This river is crossed at Greenwich, and then the country becomes more flat and uninteresting on the way to Saratoga, the night stop.

Saratoga Springs, once one of the foremost summer resorts in America, still retains its many health giving springs which won for it at least a portion of its wide reputation. The village is situated on a plateau a few miles

west of the Hudson river, and may be made the headquarters for a number of pleasant drives about the lakes in the southern end of the Adirondack region. Lake Luzerne, 22 miles north of Saratoga, is a particularly picturesque sheet of water, and one that is easily reached, despite the grades. Saratoga lake is about four miles from the village and is reached by a favorite drive termed the Boulevard.

Good roads are offered for the trip between Saratoga and Albany by way of Mechanicsville and Waterford. Below Albany is Kinderhook, where may be seen a number of ancient buildings, among

them being the Van Alen mansion built in 1721 and the Van Schaack mansion erected in 1774. Two miles below the village is Lindewald, the home of Martin Van Buren, and before that the home of Peter Van Ness. The return to New York is via Poughkeepsie.

ITINERARY NO. 50.

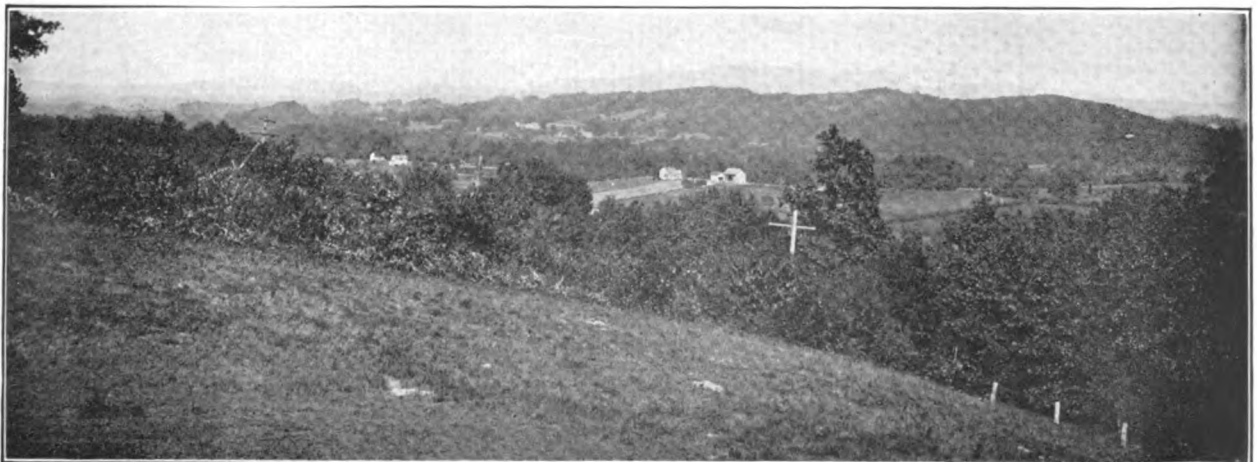
Night Stops—New York City, Waterbury, Conn.; Brattleboro, Vt.; Saratoga and Poughkeepsie, N. Y. Five Days, 503.5 Miles.

New York-Waterbury, 88.2 Miles.

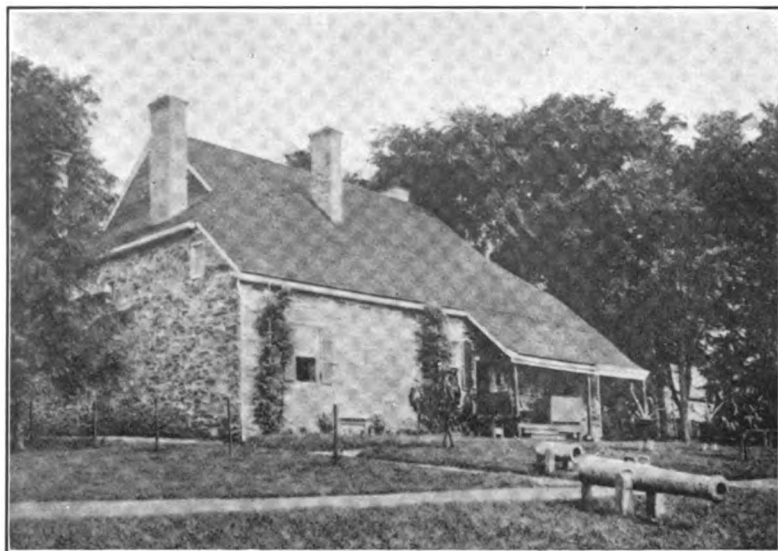
	Miles to	Total Miles	
	Out	Return	
New York.....	0.0	0.0	88.2
New Rochelle.....	16.7	16.7	71.5
Larchmont.....	1.8	18.5	69.7
Mamaroneck.....	1.6	20.1	68.1
Rye.....	3.7	23.8	64.4
Port Chester.....	1.7	25.5	62.7
Greenwich, Conn.....	3.1	28.6	59.6
Mianus.....	2.4	31.0	57.2
Stamford.....	2.7	33.7	54.5
Darien.....	4.5	38.2	50.0
Norwalk.....	4.2	42.4	45.8
Westport.....	3.3	45.7	42.5
Southport.....	4.2	49.9	38.3
Fairfield.....	1.6	51.5	36.7
Bridgeport.....	4.5	56.0	32.2
Stratford.....	3.8	59.8	28.4
Shelton.....	10.1	69.9	18.3
Derby.....	0.3	70.2	18.0
Seymour.....	5.7	75.9	12.3
Naugatuck.....	7.5	83.4	4.8
Waterbury.....	4.8	88.2	0.0

Waterbury-Brattleboro, 116 Miles.

	Miles to	Total Miles	
	Out	Return	
Waterbury.....	0.0	0.0	116.0



View of Southington Mountain, Near Waterbury, Conn., with Hanging Hills of Meriden in the Distance.



Washington's Headquarters at Newburg, N. Y., on the Hudson.

Milldale	8.0	8.0	108.0
Plantsville	2.2	10.2	105.8
Southington	1.6	11.8	104.2
Plainville	4.9	16.7	99.3
Farmington	4.6	21.3	94.7
West Hartford	5.5	26.8	89.2
Hartford	3.7	30.5	85.5
Bloomfield	6.1	36.6	79.4
Tariffville	6.1	42.7	73.3
Granby	3.4	46.1	69.9
Mechanicsville	1.2	47.3	68.7
Southwick, Mass.	6.5	53.8	62.2
Westfield	5.2	59.0	57.0
Southampton	7.9	66.9	49.1
Easthampton	4.6	71.5	44.5
Northampton	4.3	75.8	40.2
South Deerfield	11.5	87.3	28.7
Deerfield	5.1	92.4	23.6
Greenfield	3.4	95.8	20.2
Barnardston	6.6	102.4	13.6
Guilford, Vt.	11.0	113.4	2.6
Brattleboro	2.6	116.0	0.0

Brattleboro-Saratoga, 102.6 Miles.

	Miles to	Total Miles	
	Out	Out Return	
Brattleboro	0.0	0.0	102.6
W. Dummerston	6.2	6.2	96.4
Newfane	5.6	11.8	90.8
Townshend	4.4	16.2	86.4
West Townshend	4.9	21.1	81.5
Jamaica	4.5	25.6	77.0
Rawsonville	5.0	30.6	72.0
S. Londonderry	3.8	34.4	68.2
Peru	6.4	40.8	61.8
Manchester Depot	9.5	50.3	52.3
Manchester	1.7	52.0	50.6
Arlington	8.1	60.1	42.5
W. Arlington	3.3	63.4	39.2
Cambridge, N. Y.	13.7	77.1	25.5
Colla	1.3	78.4	24.2
Greenwich	7.1	85.5	17.1
Schuylerville	5.9	91.4	11.2
Saratoga	11.2	102.6	0.0

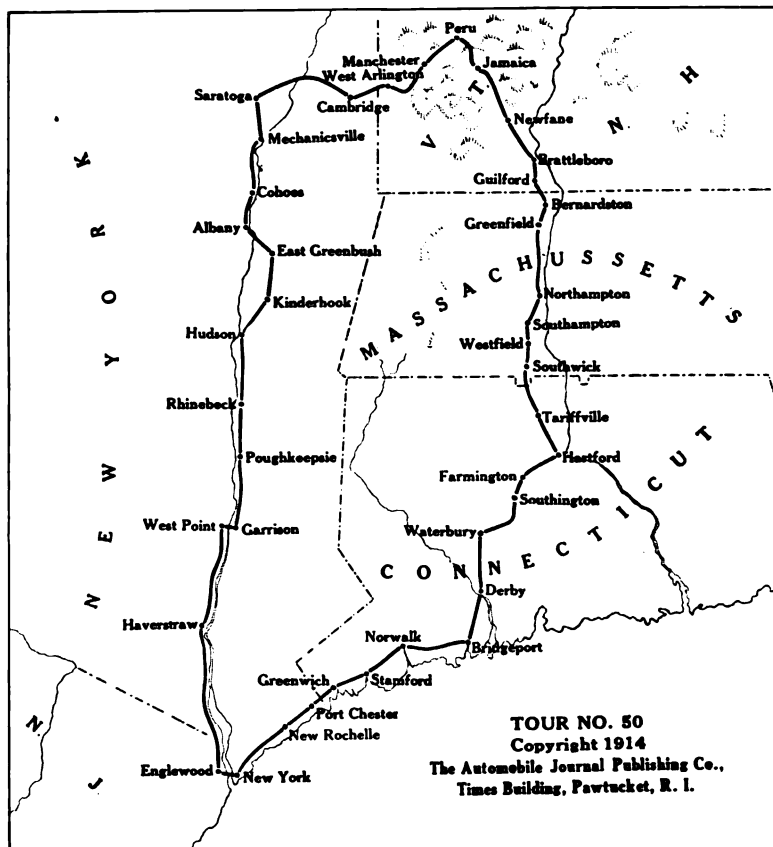
Saratoga-Poughkeepsie, 113.5 Miles.

	Miles to	Total Miles	
	Out	Out Return	
Saratoga	0.0	0.0	113.5
Malta	8.1	8.1	105.4
Maltaville	2.6	10.7	102.8

Kinderhook	13.4	59.6	53.9
Stuyvesant Falls	3.8	63.4	50.1
Rossmans	2.6	66.0	47.5
Stockport	0.5	66.5	47.0
Stockville	2.2	68.7	44.8
Hudson	3.4	72.1	41.4
Blue Stores	10.2	82.3	31.2
Upper Red Hook	6.5	88.8	24.7
Red Hook	2.5	91.3	22.2
Rhinebeck	5.9	97.2	16.3
Hyde Park	10.3	107.5	6.0
Poughkeepsie	6.0	113.5	0.0

Poughkeepsie-New York, 83.2 Miles.

	Miles to	Total Miles	
	Out	Out Return	
Poughkeepsie	0.0	0.0	83.2
Wappinger Falls	7.7	7.7	75.5
Hughsonville	1.4	9.1	74.1
Flashkill Landing	6.1	15.2	68.0
Cold Spring	7.5	22.7	60.5
Garrison	4.8	27.5	55.7
Ferry to West Point			
Highland Falls	6.3	33.8	49.4
North Haverstraw	8.4	42.2	41.0
West Haverstraw	1.4	43.6	39.6
Haverstraw	1.7	45.3	37.9
New City	5.1	50.4	32.8
Nanuet	4.3	54.7	28.5
Pearl River	3.3	58.0	25.2
Montvale	1.4	59.4	23.8
Park Ridge	0.8	60.2	23.0
Woodcliff Lake	0.8	61.0	22.2
Hillside	1.3	62.3	20.9
Westwood	0.8	63.2	20.0
Emerson	1.6	64.8	18.4
Oradell	2.4	67.2	16.0
Englewood, N. J.	6.4	73.6	9.6
Edgewater	5.6	79.2	4.0
New York	4.0	83.2	0.0

TOUR NO. 50
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Times Building, Pawtucket, R. I.

NEW YORK'S MOUNTAINS AND LAKES.

A Visit to the Adirondacks Region by Way of the Catskills and the Thousand Islands and Return Through the Berkshires and Croton Lake District.

A TOUR that combines much of interest and splendid scenery is that presented herewith as No. 51. It is outlined to occupy six days, starting from and returning to New York City, and while some of the daily mileages are large the tourist undoubtedly will be able to readjust the night stops to accommodate his fancy and the length of time it is desired to remain away from home.

The first day's route runs along the Hudson on the east shore until after passing Poughkeepsie, and soon after reaching Kingston turns into the Catskills for the night stop at Highmount. The Catskills are famed throughout the world for their beauty as well as the scene of Washington Irving's tale of Rip Van Winkle, and it is presumed that the tourist will find a single night hardly sufficient to explore their resources.

The Grand Gorge is reached early on the second day, after which the way leads into James Fenimore Cooper's country, turning north through Richfield Springs and Utica. The last named city is pleasantly situated in one of the most beautiful sections of the Mohawk valley and has a number of fine automobile roads. A particularly interesting view is to be obtained from the summit in Roscoe Conklin park. Seven miles west is the Revolutionary battlefield of Oriskany. A little to the east is the splendid Masonic home, which cost more than \$1,000,000.

The way from Rome to Watertown is over a state road with several stretches of macadam in Turin, and thence along the Black river valley. The third night stop is at Alexandria Bay. If possible the tourist should arrange to remain over here at least one whole day, as there is so much of interest to be seen that it cannot well be covered even in a much longer time. A steamer ride among the Thousand Islands in the St. Lawrence river gives some idea of the distinctive beauties of the region, but subsequent trips to other islands will indicate that each has features which are possessed by

none of the others, giving it a charm peculiar to itself.

Ogdensburg is a pretty little city at the confluence of the Oswegatchie and the St. Lawrence, the former of which affords abundant power for various manufacturing establishments. It is known as the Maple City, because of the magnificent maple trees which line its principal streets. Between Ogdensburg and Massena the tourist has opportunity to view the rapids of the St. Lawrence. The Gallops are a little less turbulent than the Rapids du Plats, but are almost as interesting. At the latter the dark

the distant ones being veiled in an exquisite violet hue. Rivers winding in and out among the green forests look like ribbons of silver, while amidst it all lies the peaceful Lake Placid, and separated from it by only a wooded eminence is Mirror lake.

Rich lake views, with occasional glimpses of Lake Champlain, are to be found on the way to Elizabethtown. Below Port Henry, at Crown Point, are the ruins of the old French Fort Frederick, the ramparts of which are brilliant with red thorn apples, in their season, a tree which is found nowhere else in the state and which



In the Midst of the Beautiful Lake Country of the Adirondacks.

swirling waters make a beautiful sight as they dash and tumble over each other in their haste.

From Malone to Lake Placid the tour traverses the Adirondacks region, with plenty of temptation to tarry. Lake Placid is perhaps the best known of all the Adirondack resorts, and is surrounded by high mountains. At the northern end the scenery becomes bold and imposing. Hoary old Mt. Whiteface raises its head 4780 feet high above the rest, cleaving the clouds in its solitary grandeur. All of the Adirondacks' gaunt peaks are in sight,

is said to have been brought here from France. An interesting drive along the lake from Ticonderoga brings the tourist to the ruins of Fort Ticonderoga, crowning a high hill near the steamboat landing.

The way then leads into Vermont, but only for a little time, then back and forth across the line, through country that is rich with inspiring views and over roads that are exceptionally good, until Hoosick Falls is reached. Near this town is the battlefield of Walloomsac, where occurred the conflict which has gone down in



At Left, View in the Vicinity of Richfield Springs; at Right, Island Dotted Lake in Catskill Foothills.

history as the battle of Bennington, fought on New York soil instead of in Vermont.

The last night stop is at Pittsfield, Mass., the Heart of the Berkshires. The way then leads through Lenox and Stockbridge, well known for the singular purity of their air. Many summer homes of wealthy people are located in this immediate vicinity and lend their beauty to nature.

The northwest corner of Connecticut is crossed before passing into the Empire state.

One of the distinctive features in the vicinity of Dover Plains is Chestnut ridge, which extends north and south for about three miles and forms a part of the watershed between the Hudson and Housatonic rivers. The small streams from the western hills

have worn deep ravines and in several places have formed beautiful cascades. A few miles from the village, one of these streams flows down the mountains in a succession of rapids, and at the foot of each fall smooth rounded holes, called wells, have been worn in the rocks to a considerable depth. Near this, and a little higher up in the mountains, is a stream which has worn a remarkable channel in the rocks, forming a cavern with a gigantic Gothic arch, known locally as "the old stone church".

ITINERARY NO. 51.

Night Stops—New York, Highmount, Utica, Alexandria Bay and Lake Placid, N.

Y.; Pittsfield, Mass. Six Days, 908.4 Miles.

New York-Highmount, 146.4 Miles.

	Miles to	Total Miles	
	Out	Return	
New York	0.0	0.0	146.4
Yonkers	13.2	13.2	133.2
Irvington	7.8	21.0	125.4
Tarrytown	2.7	23.7	122.7
Ossining	6.2	29.9	116.5
Croton	3.8	33.7	112.7
Peekskill	7.5	41.2	105.2
Cold Spring	11.3	52.5	93.9
Fishkill Landing ..	7.8	60.3	86.1
Hughsonville ...	6.2	66.5	79.9
Wappinger Falls ..	1.4	67.9	78.5
Poughkeepsie ...	7.4	75.3	71.1
Highland	2.6	77.9	68.5
Esopus	7.9	85.8	60.6
Ulster Park	2.4	88.2	58.2
Port Ewen	3.5	91.7	54.7
Kingston	4.0	95.7	50.7
Glenerie	6.8	102.5	43.9
Glenerie Falls ..	1.7	104.2	42.2



The Thousand Islands, from Alexandria Bay, One of the Prettiest Playgrounds in Northern New York.

Saugerties	2.8	107.0	39.4
Unionville	4.3	111.3	35.1
Woodstock	7.0	118.3	28.1
Bearsville	1.8	120.1	26.3
Lake Hill	3.0	123.1	23.3
Willow	2.5	125.6	20.8
Mt. Pleasant	4.2	129.8	16.6
Phoenicia	3.7	133.5	12.9
Allaben	4.3	137.8	8.6
Shandaken	1.5	139.3	7.1
Pine Hill	5.6	144.9	1.5
Highmount	1.5	146.4	0.0

Highmount-Utica, 126.9 Miles.

	Miles to	Total Miles	Out Return
Highmount	0.0	0.0	126.9
Griffins	2.0	2.0	124.9
Fleishmanns	1.5	3.5	123.4
Arkville	3.5	7.0	119.9
Kelly's Corners	2.7	9.7	117.2
Halcottville	2.0	11.7	115.2
Roxbury	6.5	18.2	108.7
Grand Gorge	7.3	25.5	101.4
Stamford	7.5	33.0	93.9
Harpersfield	6.0	39.0	87.9
Davenport	8.0	47.0	79.9
Davenport Center	1.8	48.8	78.1
West Davenport	5.0	53.8	73.1
Collins	6.8	60.6	66.3
Millford Center	2.4	63.0	63.9
Portlandville	1.3	64.3	62.6
Millford	4.4	68.7	58.2
Cooperstown	8.5	77.2	49.7
Springfield Cen- ter	10.3	87.5	39.4
Warren	3.5	91.0	35.9
Richfield Springs	3.1	94.1	32.8
East Winfield	9.1	103.2	23.7
West Winfield	2.2	105.4	21.5
Bridgewater	3.5	108.9	18.0
N. Bridgewater	3.4	112.3	14.6
Cassville	1.6	113.9	13.0
Clayville	2.8	116.7	10.2
Sauquoit	2.0	118.7	8.2
Washington Mills	3.5	122.2	4.7
Utica	4.7	126.9	0.0

Utica-Alexandria Bay, 128.3 Miles.

	Miles to	Total Miles	Out Return
Utica	0.0	0.0	128.3
Deerfield	1.4	1.4	126.9
Rome	14.9	16.3	112.0
Delta	5.9	22.2	106.1
Stokes	1.7	23.9	104.4
West Branch	4.7	28.6	99.7
Ava	3.5	32.1	96.2
West Leyden	2.8	34.9	93.4
Mohawk Hill	4.7	39.6	88.7
Constableville	4.0	43.6	84.7
Turin	4.8	48.4	79.9
Houseville	4.0	52.4	75.9
Martinsburg	4.2	56.6	71.7
Lowville	3.6	60.2	68.1
Denmark	9.1	69.3	59.0
Carthage	6.1	75.4	52.9
Heaving	4.2	79.6	48.7
Fells Mills	4.7	84.3	44.0
Black River	3.2	87.5	40.8
Watertown	6.6	94.1	34.2
Brownville	4.2	98.3	30.0
Depauville	11.2	109.5	18.8
Clayton Center	4.1	113.6	14.7
Clayton	3.7	117.3	11.0
Alexandria Bay	11.0	128.3	0.0

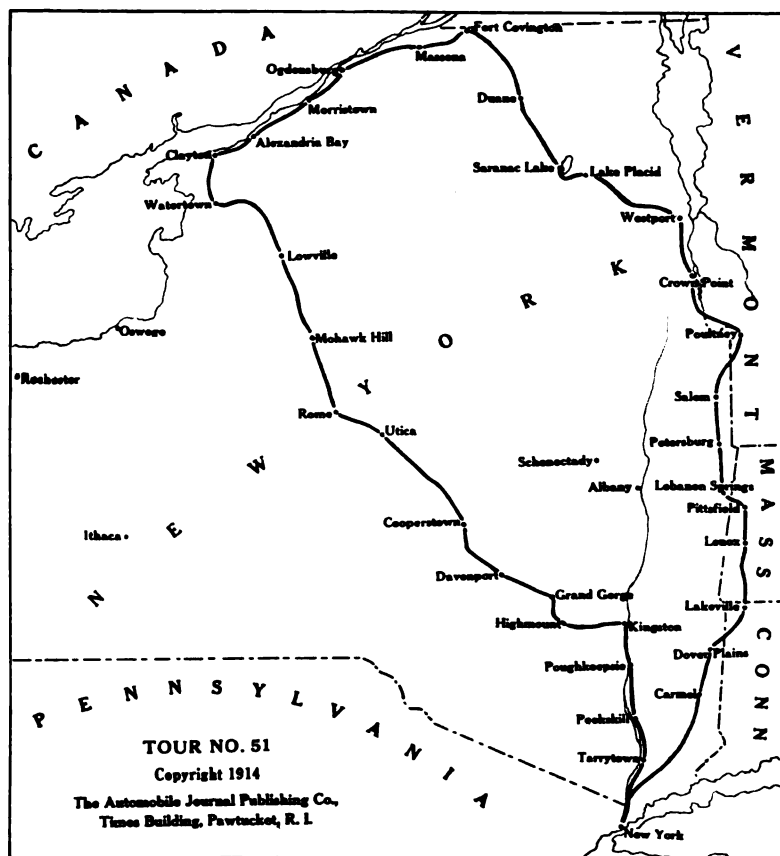
Alexandria Bay-Lake Placid, 172.7 Miles.

	Miles to	Total Miles	Out Return
Alexandria Bay	0.0	0.0	172.7
Redmond	6.7	6.7	166.0
Hammond	11.9	18.6	154.1
Briar Hill	6.0	24.6	148.1
Morristown	4.0	28.6	144.1

Ogdensburg	10.8	39.4	133.3
Waddington	19.9	59.3	113.4
Massena	17.0	76.3	96.4
Raquette River	6.4	82.7	90.0
Hogansburg	7.0	89.7	83.0
Fort Covington	8.9	98.6	74.1
Westcott Center	6.2	104.8	67.9
Malone	10.0	114.8	57.9
Whippleville	2.4	117.2	55.5
Studley Hill	5.5	122.7	50.0
Duane Center	9.2	131.9	40.8
Gabriel Station	22.2	154.1	18.6
Saranac Lake	8.8	162.9	9.8
Lake Placid	9.8	172.7	0.0

Lake Placid-Pittsfield, 187.7 Miles.

	Miles to	Total Miles	Pittsfield	Miles to	Total Miles
Lake Placid	0.0	0.0	187.7	0.0	0.0
Lenox	6.5	6.5	139.9	0.0	146.4



Cascade Lake	10.5	10.5	177.2	Stockbridge	6.0	12.5	133.9
Keene	4.7	15.2	172.5	Great Barrington	7.5	20.0	126.4
Elizabethtown	12.4	27.6	160.1	South Egremont	4.0	24.0	122.4
Westport	8.6	36.2	151.5	Lakeville, Conn.	14.9	38.9	107.5
Port Henry	10.3	46.5	141.2	Sharon	7.1	46.0	100.4
Crown Point	7.4	53.9	133.8	Dover Plains, N. Y.	13.0	59.0	87.4
Ticonderoga	8.7	62.6	125.1	South Dover	7.8	66.8	79.6
Addison Jct.	2.0	64.6	123.1	Hurds Corners	4.4	71.2	75.2
Ticonderoga Fer- ry, Vt.	0.2	64.8	122.9	Pawling	2.3	73.5	72.9
Orwell	6.1	70.9	116.8	Carmel	13.4	86.9	59.5
Benson	7.2	78.1	109.6	Lake Mahopac	5.5	92.4	54.0
Fair Haven	8.3	86.4	101.3	Baldwin Place	3.8	96.2	50.2
Poultney	5.7	92.1	95.6	Amawalk	5.1	101.3	45.1
Middle Granville, N. Y.	6.7	98.8	88.9	Yorktown Heights	1.6	102.9	43.5
Granville	2.1	100.9	86.8	Briarcliff Manor	11.2	114.1	32.3
West Pawlet, Vt.	5.0	105.9	81.8	Elmsford	8.5	122.6	23.8
Rupert	7.5	113.4	74.3	Hart's Corners	3.0	125.6	20.8
West Rupert	1.5	114.9	72.8	Central Bridge	14.1	141.2	5.2
Salem, N. Y.	6.7	121.6	66.1	New York	5.2	146.4	0.0

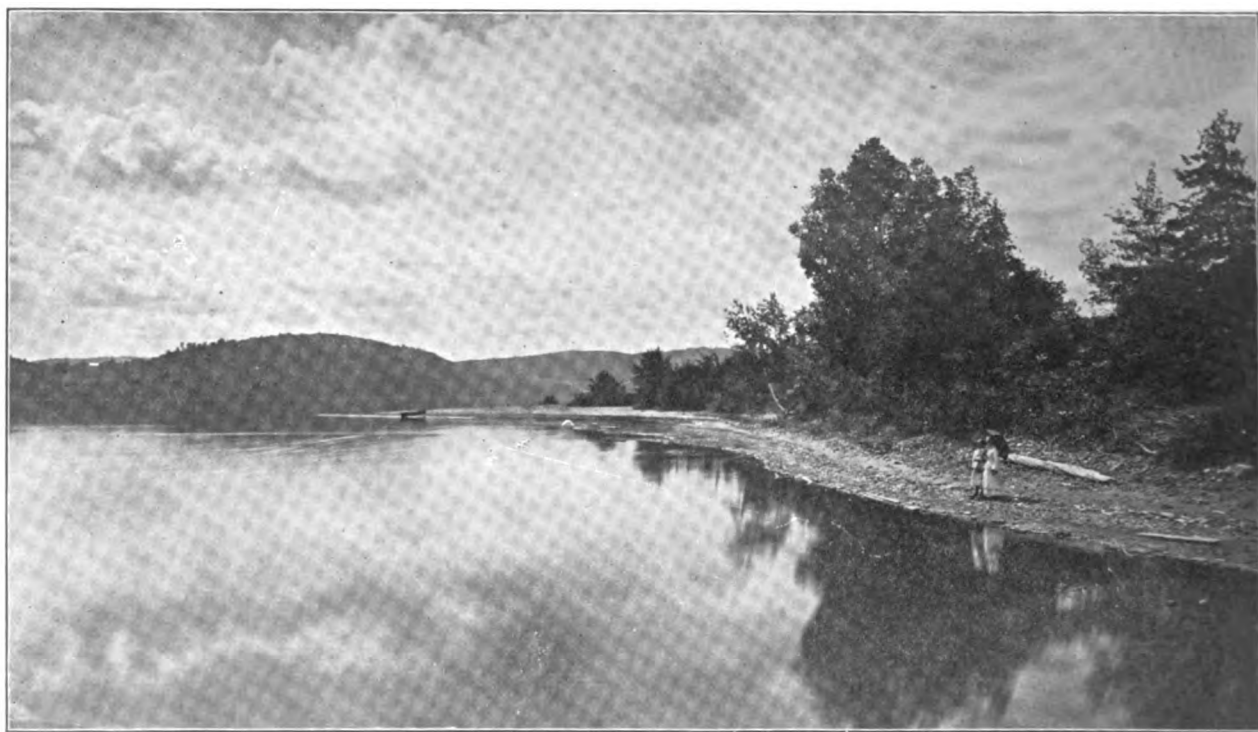
THE ADIRONDACKS AND CANADA POINTS.

Visiting Mountains and Lakes of Northern New York, Crossing the Border to Montreal, Ottawa and Toronto, and Returning by Way of Niagara Falls.

COMBINING some of the most interesting touring ground in the Dominion of Canada with the Adirondack region and a portion of the transcontinental route through central New York State, this itinerary contemplates that the motorist will start from Albany. The route the first day is along the Hudson for a time, until the falls of the Mohawk are reached north of Cohoes, and then away from the river to Saratoga.

For years Lake George has been a favored resort of those who love the beautiful in nature. The lake itself is 35 miles long and in some places four miles wide. The hills and vales of the neighborhood, as well as the waters themselves, witnessed many fierce engagements during the French and Indian, and Revolutionary wars. A few miles distant is Loon lake, one of several by that name in this region, although not so well

Considerable road work has been accomplished in the Keene valley and the motorist should have little difficulty in making Cascade Lake for the night stop. There are two of the lakes, and the scenery about them is held to be unsurpassed. Those who desire may spend some little time in this section, the roads now being in condition to permit of reaching many of the camps by automobile. The tourist is now in the Adi-



Beautiful Schroon Lake in the Foothills of the Adirondacks and Surrounded by New York's Historic Ground.

While Saratoga Springs is not the resort it once was, the mineral springs have lost none of their interest. There are still many handsome buildings and the city is by no means deserted. A short distance further along is Glens Falls, intimately associated with recollections of Uncas, the last of the Mohicans, so graphically portrayed in Cooper's romance. It was also the scene of a decisive battle between the French and English in 1755.

known as that other in the extreme northern part of the state.

Schroon lake is indeed a pretty sheet of water, 10 miles long and at an elevation of 807 feet. The valley of the Schroon river is next followed until the low divide is crossed, and the route then lies along the Pleasant valley to Elizabethtown. The way becomes rough and more mountainous at this point, albeit the views are among the best to be found in the entire Adirondack region.

ronrack foothills, and may visit the famous Ausable Chasm, with its grand succession of cascades and gorges, early the third day. Keeseville, on the lake near the Chasm, is the turning point toward Canada, which is entered by way of Plattsburg and Chazy, at Rouse's Point. Here the customs regulations will have to be observed, licenses, customs bond and numbers being secured at a reasonable fee, as well as the necessary papers for readmission of the



Brant Lake Vies with the Mountains in Tempting the Tourist.

tourist to the United States.

At St. Johns, Que., a chain of forts existed for years, extending along the Richelieu river from Sorel to Lake Champlain. It was the scene of a 45 days' siege by the Americans in 1775, at the end of which it fell and was destroyed. The St. Johns of today boasts of some excellent hotels and fine shops, as stores are termed on that side of the line, and also possesses a large barracks and military school. Across the river is Ilerville, in which there is a curiously constructed church tower, reminding the tourist of the Turkish mosques, from the turrets of which the Moslems call the people to prayer.

Montreal is replete with the historic and the interesting, both as the result of nature and man's handiwork. It has been successively under French and English rule, and was for a time in the hands of the Americans. In 1776, the commissioners of the Continental Congress, Benjamin Franklin, Samuel Chase and Charles Carroll, held council in the Chateau de Ramezay. The city was the scene of many battles between the Indians and white men, French, English and Americans and is filled with historic tablets and monuments.

The third day takes the tourist from Montreal to Ottawa. The road is of clay and in wet weather is practically impassable. Should the tourist happen to reach this point under such circumstances, he is earnestly advised to ship his car by way of boat to Kingston, and rejoin the route at that point. A somewhat better road lies along the shores of the St. Lawrence river joining this route at Prescott,

but if conditions are favorable it will pay the tourist to make the trip to Ottawa, as originally planned.

The way leads across Montreal Island, thence across the Isle of Jesus and along the shores of the Lake of Two Mountains to St. Andrews East on the River du Nord. It then lies to Carillon and across the Ottawa river to Point Fortune, following the south shore of this river to Little Rideau and L'Orignal. At this point it turns away from the river to Alfred and Plantagenet, and back again to the Ottawa at Wendover, skirting the river again to Clarence, Rockland, Cumberland and Orleans.

Ottawa is of interest because of its being the seat of the Canadian government, the buildings of which are situated on a picturesque bluff 150 feet high, overlooking the Ottawa river. They

comprise three blocks of departmental buildings, the House of Parliament occupying the fourth side of the square. The famous Chaudiere Falls, where the river dashes over a ledge of rock 1260 feet high, are located in the west end of the city and furnish power for extensive lumber operations as well as lighting and street railway plants.

The fourth day finds the tourist on good roads once more, turning back toward the States. The St. Lawrence is reached at Morrisburg and is followed to Prescott, opposite Ogdensburg, N. Y., where the boat may be taken to Niagara-on-the-Lake. Just below Prescott is the famous Patriot's Windmill, the scene of a bloody conflict in the uprising of 1837. The old mill is now a lighthouse. In making the water trip from the Thousand Islands to Montreal, passengers change at Prescott for smaller boats, more suitable for shooting rapids, some of which are passed on this tour.

The route follows the north shore of the river to Brockville, from which point there is a ferry to Morristown, N. Y. The road now turns away from the St. Lawrence for a time, though within sight of the beautiful Thousand Islands, which are seen still better at Gananoque. The Rideau river is crossed at Kingston, the night stop.

Kingston is a quaint, attractive city and will reward amply a few hours' sight-seeing. The fine busi-



Anthony's Nose and Rogers' Rock on the Banks of Lake George, N. Y.

ness blocks and public buildings offer a pleasing contrast to the old forts and other evidences of early occupation. Among the interesting places to visit are Fort Henry, the Royal Military College (Canada's West Point), Queen's University and St. George's Cathedral.

The fifth day's route skirts the north shore of Lake Ontario all the way into Toronto. Many splendid views of this immense inland lake are afforded, as the road follows the shore line for many miles. None of the towns en route are

numerous summer resorts, and Toronto is the centre from which these may be reached. If visited in the first week of September, the annual fair is worthy of a couple of days' stop.

The sixth day ends at Niagara Falls, one of the greatest wonders of the American continent. The tip of Lake Ontario is rounded at Hamilton, and from that point the roaring of the mighty cataract begins to penetrate above the humming of the motor. The approach to the falls from the Canadian

easily to be available. The trip to Queenstown Heights and Brock's monument is advised, especially. The short 20-mile drive to Buffalo can be made comfortably in the cool of the evening.

Buffalo may be considered the gateway to the immense touring country from the West. Similarly, it might be added, that the tourist could so plan an extension of his vacation to include portions of the Middle West before returning.

The return trip from Buffalo is almost too well known by motorists to need extended comment. There should be little trouble except in the so-called Montezuma swamp between Montezuma and Port Byron, and then only in wet weather. Among the points of interest on the way may be mentioned the home of Joseph Smith, the founder of Mormonism, at Palmyra, where he claimed to have discovered the golden plates of the Book of Mormon. Nearby is the village of Hydesville, the home of the Fox sisters, who were instrumental in establishing Spiritualism. Three miles north of Oneida is located the famous Oneida Community, founded in 1847. South of this town is the Oneida Indian reservation, from which excellent views of Oneida lake may be obtained. The last portion of the tour is along the Mohawk valley.

ITINERARY NO. 52.

Night Stops—Albany and Cascade Lake, N. Y.; Montreal, Ottawa, Kingston and Toronto, Can.; Buffalo and Syracuse, N. Y. Eight Days, 1127.9 Miles.

Albany-Cascade Lake, 152.4 Miles.

	Miles to	Total Miles
	Out	Return
Albany	0.0	152.4
Loudenville	4.5	147.9
Newtonville	1.4	146.5
Lathams Corners	1.7	144.8
Cohoes	4.5	140.3
Waterford	1.9	138.4
Mechanicville	8.6	129.8
Maltaville	6.1	123.7
Malta	2.2	121.5
Saratoga	8.1	113.4
Wilton	7.8	105.6
Glens Falls	11.3	94.3
Frenchmont	4.3	90.0
Lake George	3.8	86.2
Warrensburg	6.5	79.7
Chestertown	12.5	67.2
Loon Lake	4.0	63.2



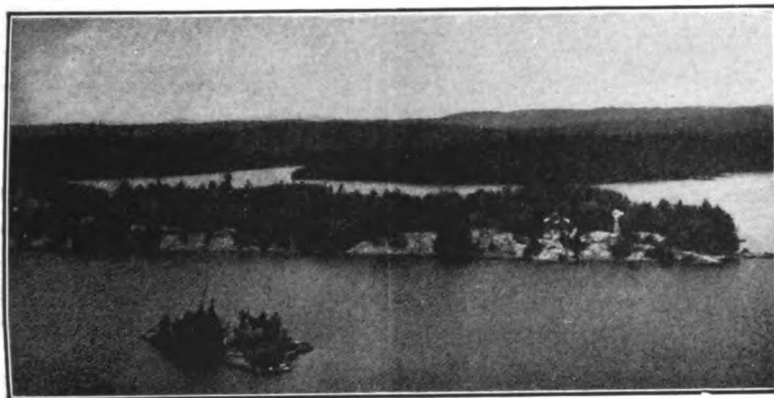
Where the River Has Made Its Mark in the Ausable Chasm, N. Y.

large, but offer sufficient opportunity to study the people and furnish a safe source of fuel supply at all times.

Toronto is a beautiful modern city, rich in architectural attractions and containing many eminent institutions of learning. Its extensive parks, broad avenues and pleasant environs make it exceedingly interesting to tourists. Located on the lake for some distance on either side of the city are

side is perhaps a little less beautiful than from the American, still, there is so much that is grand and awe inspiring concerning the spectacle that comparisons seem out of place.

The customs regulations will have to be arranged at the Falls. Naturally, the tourist will desire some little time for exploration, and fortunately, the roads throughout the day's trip are such that the whole afternoon ought



The Beautiful Muskoka Lake Country, North of Ottawa, Canada.

Potterville	4.9	94.1	58.3
Taylor-on-Schroon	3.8	97.9	54.5
Schroon Lake	5.7	103.6	48.8
Schroon River	9.1	112.7	39.7
Elizabethtown	22.6	135.3	17.1
Keene	12.4	147.7	4.7
Cascade Lake	4.7	152.4	0.0

Cascade Lake-Montreal, 129.3 Miles.

	Miles to	Total Miles	
	Out	Return	
Cascade Lake	0.0	0.0	129.3
Keene	4.7	4.7	124.6
Upper Jay	8.1	10.8	118.5
Jay	3.7	14.5	114.8
Ausable Forks	6.1	20.6	108.7
Clintonville	5.4	26.0	103.3
Keeseville	6.3	32.3	97.0
Peru	6.1	38.4	90.9
Plattsburg	9.7	48.1	81.2
Halsey Corner	1.5	49.6	79.7
E. Beekmantown	3.1	52.7	76.6
Beekmantown	2.0	54.7	74.6
West Chazy	3.7	58.4	70.9
Chazy	6.4	64.8	64.5
Champlain	7.0	71.8	57.5
Rouse's Point	5.1	76.9	52.4
La Colle Junction, Que.	5.3	82.2	47.1
St. Pauls	6.4	88.6	40.7

St. Johns	12.4	101.0	28.3
Chambly	11.4	112.4	18.9
St. Hubert	8.9	121.3	8.0
Longueuil	5.0	126.3	3.0
Montreal	3.0	129.3	0.0

Montreal-Ottawa, 121 Miles.

	Miles to	Total Miles	
	Out	Return	
Montreal	0.0	0.0	121.0
St. Laurent	6.9	6.9	114.1
Borde a Plouffe	4.1	11.0	110.0
St. Martin	1.6	12.6	108.4
St. Eustace	7.9	20.5	100.5
St. Benoit	11.3	31.8	89.2
St. Placide	6.4	38.2	82.8
St. Andrews East	8.4	46.6	74.4
Carrillon	2.2	48.8	72.2
Ferry to Point Fortune	5.4	54.2	66.8
Little Rideau	7.7	61.9	59.1
Hawkesbury	3.1	65.0	56.0
L'Original	2.5	67.5	53.5
Cassburn	10.0	77.5	43.5
Alfred	7.0	84.5	36.5
Plantagenet	6.0	90.5	30.5
Wendover	5.5	96.0	25.0
Clarence	2.5	98.5	22.5
Rockland	5.0	103.5	17.5
Cumberland	7.0	110.5	10.5
Orleans	10.5	121.0	0.0

Ottawa-Kingston, 132.5 Miles.

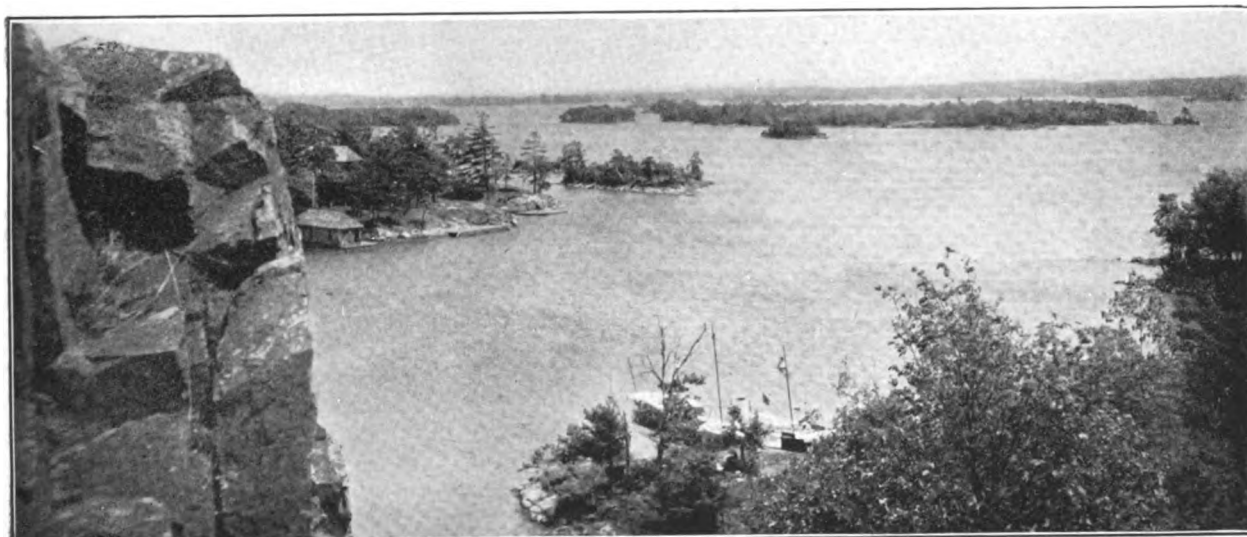
	Miles to	Total Miles	
	Out	Return	
Ottawa	0.0	0.0	132.5
S. Gloucester	13.0	13.0	119.5
Metcalfe	4.0	17.0	115.5
Ormond	8.0	25.0	107.5
Winchester	4.0	29.0	103.5
Cass Bridge	3.5	32.5	100.0
Williamsburg	8.5	41.0	91.5
Morrisburg	6.0	47.0	85.5
Iroquois	6.0	53.0	79.5
Cardinal	5.5	58.5	74.0
Prescott	9.6	68.1	64.4
Brockville	12.2	80.3	52.2
Lyn Village	6.3	86.6	45.9
Gananoque	27.3	113.9	18.6
Kingston	18.6	132.5	0.0

Kingston-Toronto, 165 Miles.

	Miles to	Total Miles	
	Out	Return	
Kingston	0.0	0.0	165.0
Cataraqui	3.6	3.6	161.4
Napanee	21.9	25.5	139.5
Maryville	8.4	33.9	131.1
Shannonville	6.7	40.6	124.4
Belleville	8.8	49.4	115.6
Trenton	11.3	60.7	104.3
Brighton	9.4	70.1	94.9
Colborne	8.3	78.4	86.6
Grafton	7.8	86.2	78.8
Cobourg	7.6	93.8	71.2
Port Hope	7.4	101.2	63.8
Welcome	3.1	104.3	60.7
Newcastle	13.3	117.6	47.4
Boumanville	5.2	122.8	42.2
Oshawa	9.4	132.2	32.8
Whitby	4.2	136.4	28.6
Pickering	6.1	142.5	22.5
Liverpool	2.2	144.7	20.3
Riverdale	18.5	163.2	1.8
Toronto	1.8	165.0	0.0

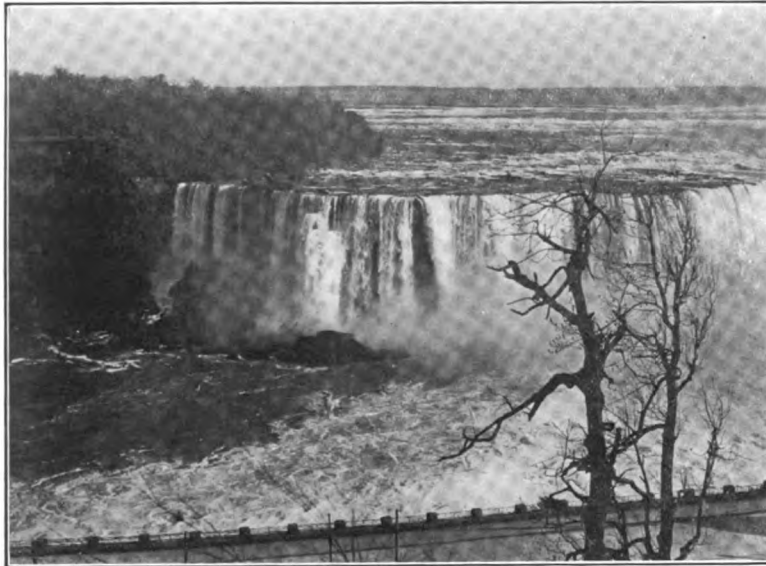
Toronto-Buffalo, 120.1 Miles.

	Miles to	Total Miles	
	Out	Return	
Toronto	0.0	0.0	120.1
Cooksville	16.3	16.3	103.8
Erindale	3.3	19.6	100.5
Trafalgar Village	5.1	24.7	95.4
Appleby	10.3	35.0	85.1
Freeman	3.8	38.8	81.3
Aldershot	2.8	41.6	78.5
Hamilton	5.4	47.0	73.1



The Thousand Islands of the St. Lawrence River, Viewed from Owl's Point, Near Kingston, Ont.

Stony Creek.....	6.7	53.7	66.4	N. Tonawanda ..	6.2	110.2	9.9
Winona	5.6	59.3	60.8	Tonawanda	0.4	110.6	9.5
Grimsby	5.1	64.4	55.7	Buffalo	9.5	120.1	0.0
Beamsville	4.9	69.3	50.8	Buffalo-Syracuse, 162.0 Miles.			
Vineland	4.2	73.5	46.6				
Jordan	1.8	75.3	44.8				
St. Catharines...	7.1	82.4	37.7				
Homer	3.3	85.7	34.4				
					Miles to	Total Miles	
				Buffalo	0.0	0.0	162.0



Niagara Falls, as Seen from the Canadian Side.

St. Davids	4.9	90.6	29.5	Williamsville ...	9.8	9.8	152.2
Stamford	2.1	92.7	27.4	Clarence	8.3	18.1	143.9
Niagara Falls, Ont.	4.8	97.5	22.6	Pembroke	7.9	26.0	136.0
Niagara Falls, N. Y.	1.0	98.5	21.6	East Pembroke..	6.6	32.6	129.4
Echota Station...	2.5	101.0	19.1	Batavia	6.6	39.2	122.8
La Salle	3.0	104.0	16.1	Byron	9.8	49.0	113.0
				Bergen	6.6	55.6	106.4
				Churchville	3.4	59.0	103.0

North Chili.....	4.4	63.4	98.6
Rochester	10.4	73.8	88.2
Brighton	3.2	77.0	85.0
Fairport	6.8	83.8	78.2
Macedon	8.3	92.1	69.9
Yellow Mills	2.7	94.8	67.2
Palmyra	1.2	96.0	66.0
East Palmyra....	4.9	100.9	61.1
Newark	4.6	105.5	56.5
Lyons	6.1	111.6	50.4
Lock Berlin	4.2	115.8	46.2
Clyde	4.4	120.2	41.8
Savannah	6.4	126.6	35.4
Montesuma	5.4	132.0	30.0
Port Byron	4.6	136.6	25.4
Weedsport	3.5	140.1	21.9
Elbridge	6.4	146.5	15.5
Camillus	7.2	153.7	8.3
Syracuse	8.3	162.0	0.0

Syracuse-Albany, 145.6 Miles.

	Miles to	Total Miles	
	Out	Return	
Syracuse	0.0	0.0	145.6
Fayetteville	7.6	7.6	138.0
Mycenae	4.5	12.1	133.5
Sullivan	4.3	16.4	129.2
Canastota	5.1	21.5	124.1
Wampsville	2.2	23.7	121.9
Oneida	3.4	27.1	118.5
Oneida Castle....	1.4	28.5	117.1
Vernon	5.2	33.7	111.9
Kirkland Village	8.3	42.0	103.6
New Hartford...	5.1	47.1	98.5
Utica	3.5	50.6	95.0
Deerfield	1.4	52.0	93.6
West Schuyler...	1.0	53.0	92.6
Ilion	10.4	63.4	82.2
Herkimer	2.7	66.1	79.5
Little Falls	7.3	73.4	72.2
St. Johnsville....	10.5	83.9	61.7
Palatine Bridge..	8.8	92.7	52.9
Yost's Station...	6.2	98.9	46.7
Fonda	5.3	104.2	41.4
Alken	7.7	111.9	33.7
Amsterdam	3.0	114.9	30.7
Scotia	14.1	129.0	16.6
Schenectady	1.6	130.6	15.0
Albany	15.0	145.6	0.0

THE LAKES OF CENTRAL NEW YORK.

After a Day in the Vicinity of James Fenimore Cooper's Home, the Tourist Reaches One of America's Most Interesting Groups of Inland Lakes.

FOR those who delight in the romantic, somewhat off the beaten paths, no section of the East contains more charm than the lake district of central New York. Fortunately the towns in the vicinity early recognized the advantages of cultivating automobile touring, inasmuch as they are not a little neglected by the railroads. Their delightful scenery is such as to merit wide attention on the part of the tourist and the motor car has done much to bring these beauties within easy reach.

Leaving Binghamton the morning of the first day, the tour follows the valley of the Susquehanna river for some distance, skirting the foothills of the Catskill

mountains, particularly as the route nears Oneonta. Numerous small lakes and pretty little trout brooks divide attention with the hills and mountains in the distance, but it is not until Coopers-town is reached that it may be said the lake region is entered.

Cooperstown, the home of James Fenimore Cooper, is on the shore of Otsego lake, and this entire region has been so touched by his genius as to be familiar ground to those who revel in his works. In a park at the centre of the town is a boulder surmounted by the figure of an Indian, which marks the spot where Cooper lived. Fairly good roads encircle the lake, and time might be spent

profitably in catching numerous glimpses of its remarkable beauty on this side trip.

The night stop is at Richfield Springs on Canadago lake, better known by the name of Schuyler. No more inspiring views are to be found anywhere on the American continent than in this vicinity. It is extremely doubtful if the tourist will be satisfied with a night stop at this point, but other lakes still further along offer other charms, and it will be hard for the motorist to decide just how much time he may allow himself away from home.

The second day's run enters the Mohawk valley, which is followed into Syracuse, not forgetting to



Pine Grove Drive, a Pleasing Scene Near Richfield Springs, N. Y.

mention Cazenovia, a summer resort of considerable repute situated at the foot of a pretty little lake, which empties into Lake Oneida. Time should permit of taking the pleasing little drive about the shores of this sheet of water. After leaving Syracuse, the main route through central New York is followed for a time, practically into Geneva.

Auburn is on Cayuga lake, which may be skirted if it is desired to extend the tour beyond the three days originally planned. This additional mileage will amply repay, as there are many attractions within easy driving distance. Among these may be mentioned Taghanic falls, at the end of a gorge a mile long and 400 feet deep, where the water takes a sheer drop of 250 feet, higher than Niagara.

Geneva is on Seneca lake, which is reached along the banks of the Seneca river from Seneca Falls, after the Montezuma marshes are passed. This lake is considered the most picturesque of the entire group. It is 38 miles long and from two to six miles wide. Steamers may be taken from Geneva to Watkins, if more time is desired for exploring portions of this district. This route anticipates making Penn Yan, on the shores of Keuka lake, the night stop.

Penn Yan is some 900 feet

above the level of Seneca lake, and the road from Geneva is a gradual rise, although it can be made practically all of the way on high speed. Possibly it will be well to continue the journey about two miles south of the city itself for the night stop, as here opportunity is afforded to spend the night on the banks of the lake in a new hostelry, which is famed throughout this district for treatment accorded to motorists.

The third day finds the tourist

between the two arms of the lake on his way to Bluff Point, 700 feet above the surface of Keuka, which is 900 feet above the level of Seneca. From this elevation an extensive view of the surrounding country is obtained, a clear day affording glimpses of four counties. Looking down upon the lake itself, the visitor is surprised to see what appears to be a toy steamboat, and finds it hard to believe it is one of the large lake steamers with a capacity of 400 to 500 people. Immediately below a reflection of glistening oars and little specks on the water, not unlike a school of minnows, prove to be full sized rowboats filled with fishing parties.

Keuka lake is in the centre of the rich grape country, and the district is famed for its wines and champagnes. None the least of the pleasing pictures from Bluff Point are the vine clad, ravine broken hills, many of which will be visited on the trip from Bluff Point to Hammondsport, but first the tourist must turn north to get around the lower end of the other arm of the lake at Branchport.

From Branchport to Hammondsport is a steady drop, with the lake level lost to view. On either side are to be seen the vineyards, and at Hammondsport, 300 feet above the surface of the lake, the tourist finds a view to the northward, which for breadth, distance and picturesque



One of the Many Interesting Trout Streams in the Foothills of the Catskills.

beauty is to be equalled nowhere.

Hammondsport is the home of Glenn H. Curtiss, and his plant for the manufacture of aeroplanes. A visit to this industry will offer a pleasing diversion, as many of the Curtiss aviators are continually testing out new machines in the vicinity of the city. Recent activities have been in connection with the perfection of the hydraeroplane, and the waters of the lake are utilized by the United States naval students of aviation as well as the Curtiss instructors in exploiting the latest inventions.

Sometimes the cut is no more than 10 feet wide, while at others it broadens out into vast amphitheatres, in which the echo of the tourist's voice sounds wierd and almost supernatural. This chasm penetrates the hills for three miles, winding and curving abruptly, and presenting an almost infinite variety of rocky and picturesque scenes.

The return to Binghamton is over the divide into the Susquehanna valley. The country is still picturesque, although by no means as romantic in its beauty

Binghamton-Richfield Springs, 100.4 Miles.

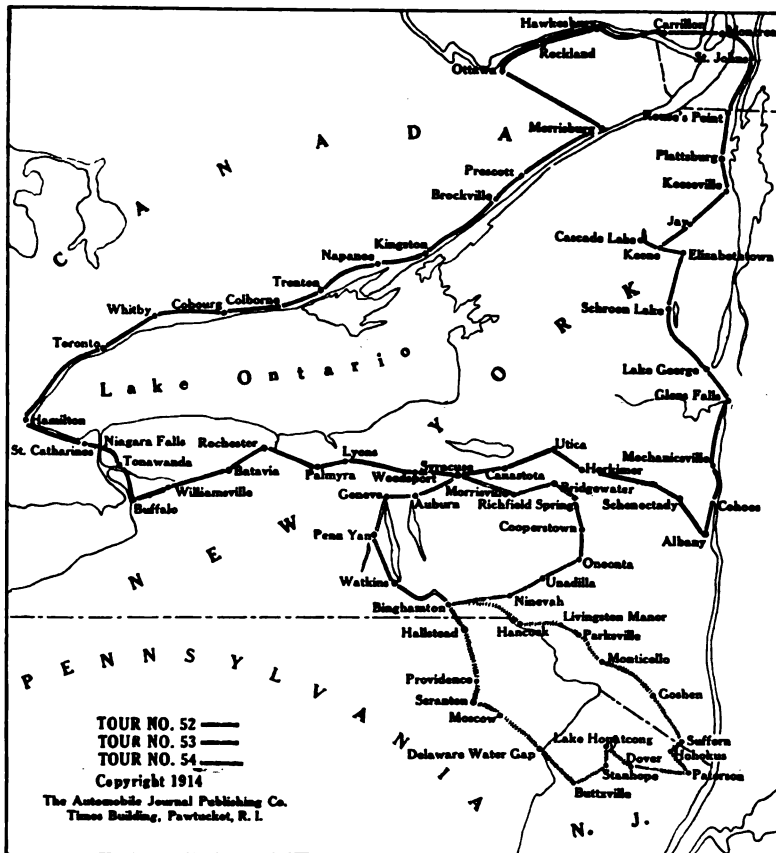
	Miles to	Total Miles
	Out	Return
Binghamton	0.0	0.0
Port Crane	7.2	7.2
Sanitarla Springs	3.4	10.6
Belden	6.2	16.8
Harpurville	3.6	20.4
Ninevah	1.7	22.1
Afton	5.3	27.4
Bainbridge	5.3	32.7
Unadilla	10.8	43.5
Wellsbridge	5.1	48.6
Otego	4.4	53.0
Oneonta	8.4	61.4
Colliers	5.5	66.9
Milford Center	2.4	69.3
Portlandville	1.3	70.6
Milford	4.6	75.2
Bartwick	4.3	79.5
Cooperstown	4.3	83.8
Springfield Center	9.9	93.7
Warren	3.6	97.3
Richfield Springs	3.1	100.4

Richfield Springs-Penn Yan, 138.6 Miles.

	Miles to	Total Miles
	Out	Return
Richfield Springs	0.0	0.0
East Winfield	9.1	9.1
West Winfield	2.2	11.3
Bridgewater	3.5	14.8
Sangerfield	7.5	22.3
Madison	6.1	28.4
Bouckville	3.2	31.6
Pine Woods	1.2	32.8
Morrisville	4.3	37.1
Nelson	3.9	41.0
Cazenovia	7.1	48.1
Oran	6.3	54.4
Manlius	2.9	57.3
Fayetteville	2.8	60.1
Syracuse	7.6	67.7
Camillus	8.3	76.0
Elbridge	7.2	83.2
Sennett	5.3	88.5
Auburn	5.2	93.7
Seneca Falls	12.8	106.5
Waterloo	3.6	110.1
Geneva	6.9	117.0
Flint	7.2	124.2
Halls Corners	6.2	130.4
Benton Center	4.2	134.6
Penn Yan	4.0	138.6

Penn Yan-Binghamton, 133.1 Miles.

	Miles to	Total Miles
	Out	Return
Penn Yan	0.0	0.0
Bluff Point	11.9	11.9
Branchport	7.8	19.7
Catawba	8.1	27.8
Urbana	6.2	34.0
Hammondsport	4.8	38.8
Wayne	8.6	47.4
Lake Wauneta	3.9	51.3
Weston	0.7	52.0
Tyrone	1.1	53.1
Watkins	0.9	63.0
Montour Falls	2.3	65.3
Odessa	3.8	69.1
Alpine	4.1	73.2
Cayuta	3.0	76.2
Vanetta	0.9	86.1
Spencer	3.3	89.4
Candor	8.6	98.0
Catatonk	6.0	104.0
Owego	4.5	108.5
Appalachan	8.1	116.6
Vestal	6.2	122.8
Endicott	1.1	123.9
Leathershire	5.3	129.2
Binghamton	3.9	133.1



Turning eastward again, the way leads past Lake Wauneta, between Weston and Wayne, and then on to Watkins, at the southern end of Seneca lake. Here, time should be spent in visiting the famous Watkins Glen, one of the most remarkable of nature's wonders, now a state park.

During the ages the small stream, in making its way from the hills to Seneca lake, has worn a deep gorge in the soft rock at this point, until now the water tumbles over a series of gorges, some of them nearly 200 feet deep.

as that which has occupied the tourist for the greater portion of three days. The road is excellent, while not of macadam, and good time can be made throughout this portion of the trip.

ITINERARY NO. 53.

Night Stops—Binghamton, Richfield Springs and Penn Yan, N. Y. Three Days, 372.1 Miles.

POCONO MOUNTAINS AND SUFFERN HILLS.

Itinerary Covers Northeastern Pennsylvania, Delaware Water Gap, Northern New Jersey and the Wallkill Valley in New York State.

TOUR No. 54 has Binghamton, N. Y., as its starting point, with Delaware Water Gap, Penn., and Suffern, N. Y., as night stops. It covers northeastern Pennsylvania, northern Jersey and the Wallkill valley of New York, and makes a number of connections with other tours outlined herein.

Crossing the Pennsylvania line, the first town of importance is Hallstead, rich in Indian traditions. The tiny gravel point in the middle of the Susquehanna at this place was once an island, around which the savages used to race in canoes, the prize for the swiftest being the honor of chief of the funmakers for the day. High upon the cliffs above the river, at a point seemingly inaccessible, was once a picture of a red chief in full war paint. The picture gradually faded, but the red remained, giving to the cliff its present name of Red Rock.

Scranton is situated in a pocket among the mountains and on the banks of the beautiful Lackawanna. The outskirts of the city are marked by a number of culm banks and coal breakers, bearing eloquent testimony of the unceasing search for coal.

The tour then begins the climb to Mt. Pocono, and descends to Stroudsburg, the views presenting panoramas of waving pine, mountain laurel and rhododendron, which grow in endless profusion along the walks and driveways in this section. The night stop is at Delaware Water Gap.

The second day's run enters New Jersey, climbing into the Schooleys mountain region, and visiting the interesting district about Lake Hopatcong. The roads will be found to be good for the most part, with occasional stretches of macadam. The views of mountains on either side, combined with those of the fertile valley, make this an ideal trip. The night stop is Suffern, N. Y., from which point connection is made with tour No. 61 for the New England states.

Goshen is in the midst of

a famed stock producing country. Middletown is the centre from which the famous Orange county milk and butter is shipped to New York City and other points. Highview is located on the eastern slope of the Shawangunk mountains, and as its name implies, affords a broad and extensive view of the valleys and the Catskills.

ous trout streams, making this town deservedly popular as a fishing ground.

At Ferndale the road crosses the east branch of the Mongaup river, the scenery around which is wild. Liberty falls, nearby, have an added interest. Lake Ophelia at Liberty is a pretty sheet of water, and the highlands about



Eastman's Glen in the Vicinity of Livingston Manor, N. Y.

Mamakating is on the other slope of the same mountain, and near this is Mamakating park on the banks of the lake by the same name, a beautiful body of spring water covering 100 acres.

Connection is again made with tour No. 61 at Wurtsboro, on its return from New England points. Within 1.5 miles of Rock Hill are six lakes, besides numer-

this region form a chain of foothills extending to the Catskills, 20 to 40 miles distant, although in plain view, from the broad plateau on which the town is located.

Parksville is in the heart of an immense trout country. Livingston Manor, at the junction of the Willowemoc and Little Beaverkill rivers, is situated in a wide valley, and the surrounding hills lend



Chestnut Point at the Head of Lake Hopatcong, N. J.

much to its attractions. Among the points of interest are the celebrated Eastman, Marguerite and Woolsey falls, near the highway.

It is said to be worth 10 years of city life to spend a week among the trout haunts in the vicinity of Cook's falls. At East Branch the Beaverville pours its spring waters into the Delaware, and bass fishing is said to be the best in the state. The remainder of the distance into Binghamton is by way of Hancock, Rood's Creek, Deposit, Damascus and Windsor.

ITINERARY NO. 54.

Night Stops—Binghamton, N. Y.; Delaware, Water Gap, Penn.; Suffern, N. Y. Three Days, 397.8 Miles.

Binghamton-Delaware Water Gap, 112 Miles.

	Miles to	Total Miles
	Out	Return
Binghamton	0.0	112.0
Kirkwood	8.9	103.1
Great Bend, Penn.	5.7	14.6
Hallstead	0.7	15.3
New Milford	6.0	21.3
Harford	7.1	28.4
Glenwood	10.4	38.8
Fleetville	3.7	42.5
Wallsville	2.7	45.2
Waverly	4.0	49.2
Clark's Green	2.0	51.2
Clark's Summit	0.5	51.7
Chincilla	1.7	53.4
Providence	3.1	56.5
Seranton	2.8	59.3
Elmhurst	8.5	67.8
Moscow	3.3	71.1
Gouldsboro	10.3	81.4
Tobyhanna	5.6	87.0
Mt. Pocono	5.1	92.1
Paradise	4.1	96.2
Henryville	2.8	99.0

Analomink	4.1	103.1	8.9
Stroudsburg	5.2	108.3	3.7
Delaware Water Gap	3.7	112.0	0.0

Delaware Water Gap-Suffern, 124.8 Miles.

	Miles to	Total Miles
	Out	Return
Delaware Water Gap	0.0	0.0
Portland	5.3	5.3
Myers Ferry	2.9	8.2
Delaware, N. J.	0.4	8.6
Bridgeville	5.6	14.2
Buttsville	1.2	15.4
Pequest	1.7	17.1
Townsbury	2.2	19.3
Danville	2.5	21.8
Great Meadow	0.5	22.3
Vienna	1.0	23.3
Hackettstown	3.9	27.2
Warrenville	3.7	30.9
Allamuchy	1.5	32.4
Andover	6.2	38.6
Stanhope	6.3	44.9
Port Morris	1.5	46.4

Lake Hopatcong.	6.3	52.7	72.1
Kenil	5.5	58.2	64.6
Dover	3.9	62.1	62.7
Rockaway	3.3	65.3	59.5
Denville	2.2	67.5	57.3
Parsippany	3.5	71.0	53.8
Boonton	2.5	73.5	51.3
Montville	1.9	75.4	49.4
Lowaco	2.3	77.7	47.1
Mountain View	4.3	82.0	42.8
Paterson	6.3	88.3	36.5
Hackensack	8.0	96.3	28.5
Arcola	3.5	99.8	25.0
Hohokus	6.2	106.0	18.8
Suffern, N. Y.	18.8	124.8	0.0

Suffern-Binghamton, 161 Miles.

	Miles to	Total Miles
	Out	Return
Suffern	0.0	0.0
Ramapo	1.8	1.8
Tuxedo	4.7	6.5
Monroe	10.1	16.6
Chester	6.7	23.3
Goshen	4.4	27.7
Middletown	8.4	36.1
Highview	8.7	44.8
Manakating	1.9	46.7
Wurtsboro	1.6	48.3
Rock Hill	7.0	55.3
Bridgeville	1.6	56.9
Monticello	3.8	60.7
Bushville	5.7	66.4
Strongtown	3.3	69.7
Ferndale	0.9	70.6
Liberty	2.3	72.9
Parkville	4.1	77.0
Livingston Manor	5.6	82.6
Roscoe	6.7	89.3
Cooks Falls	6.2	95.5
Elk Brook	2.8	98.3
Bealville	5.0	103.3
East Branch	1.9	105.2
Flash's Eddy	4.9	110.1
Hancock	8.4	118.5
Rood's Creek	6.0	124.5
Deposit	6.6	131.1
Damascus	12.5	143.6
Windsor	2.2	145.8
West Windsor	6.7	152.5
Binghamton	8.5	161.0



One of the Pretty Lake Scenes at Laurel Springs, N. J.

CROSSING MOUNTAINOUS PENNSYLVANIA.

Part of the Transcontinental Route from Philadelphia Westward to Pittsburg, Thence to Lake Chautauqua and Buffalo and Return Over the Poconos.

CCROSSING and recrossing the mountains of Pennsylvania, the itinerary outlined as No. 60 will make its appeal to those who enjoy rich scenery and are not adverse to testing the merits of the car. The start is made from Philadelphia, and it is possible to utilize portions of this itinerary in making a transcontinental tour from almost any point in the East.

Philadelphia is left by way of the beautiful Fairmount park. Bryn Mawr is the seat of Bryn Mawr College for girls. Paoli is the scene of an American defeat in 1777. Fine views of the Chester valley are obtained a little later. Lancaster was the state capital from 1799 to 1812, when it was removed to Harrisburg. The Susquehanna is crossed at York, which is noted for its slate quarries and old sulphur springs.

Gettysburg is the most elaborately and accurately marked battlefield in the world, having more monuments and memorials than all other battlefields combined. The National Cemetery is a beautiful spot and the night's stay in this historic environment is none too long. It is possible to locate the points at which the different detachments of the opposing forces made history in the memorable conflict. Seminary ridge, guarded here and there by guns; Cemetery hill, with its earthworks still intact; Culp's hill, with its battle scarred trees; Cemetery ridge, with its long line of monuments; Devil's Den, with its bullet marked boulders; the Peach Orchard, the Whirlpool of Death and the Bloody Angle, are all spots that every American desires to visit.

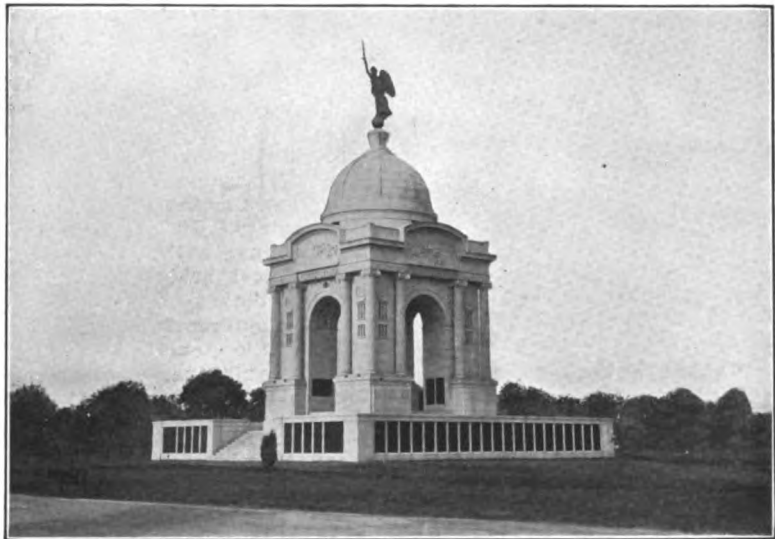
Splendid mountain scenery compensates for the poorer roads leading to Bedford. Chambersburg was the site of Lee's camp, when he decided to march on Gettysburg, and the second day's route thus reverses that taken by the Confederate general after destroying the stores at Chambersburg. Near Bedford are the famous Bedford springs, and some excellent drives are to be enjoyed in this

vicinity. Most tourists will desire to make this the night stop, proceeding to Altoona in a separate stage.

The road to Altoona is gradually being turned into macadam. While it is possible to make direct connections with Pittsburg from Bedford, it is more desirable to take the longer itinerary outlined herein. The way leads along the Alleghenies for the entire length. Beyond Altoona the roads are by no means the best in the country, although the rich mountain views obtained amply repay the tourist for visiting the section.

1897. Here may be seen Phipps Conservatory, ranking among the finest in America; the Carnegie Institute and the Carnegie library. In Pittsburg itself is located the Allegheny county court house, the main tower of which is 420 feet high and commands a splendid view of the valley.

The road to Sheffield and Warren is through the oil fields. There are some charming mountain views on the way to Butler, after which the tourist will find plenty to occupy his attention in studying the oil wells. After leaving Warren the next point of interest



One of the Many State Monuments on the Gettysburg Battlefield.

Pittsburg is best known as the Smoky City, and is famous for its steel works. It was settled in 1753 by the French, who built a line of forts along the Ohio and Allegheny rivers, that at this point being named Fort Duquesne. This was destroyed in 1758, and later was succeeded by Fort Pitt. The history of Pittsburg as such dates from 1765. Its commercial advantage is gained through the fact that it is in the centre of the richest coal district in the world.

Across the river is Allegheny, formerly a separate municipality, but incorporated with Pittsburg in

is Lake Chautauqua, one of the most remarkable sheets of water in western New York. The lake is nearly 20 miles long and although but seven miles from Lake Erie, is 720 feet above its level and its waters flow into the far-away Gulf of Mexico.

Several well known resorts are located on this lake, but perhaps the best known is that of Chautauqua. This is the home of the world renowned Chautauqua literary and scientific circle, where summer after summer, students from all over the world assemble, in the midst of surroundings



Washington's Headquarters at Valley Forge, as It Appears Today.

which cannot help but stimulate, and pursue their studies of the languages and scientific subjects.

Jamestown, at the eastern extremity of the lake, is only a short distance from Celoron, which resembles very much a seacoast resort. Excellent opportunity is offered for fresh water bathing, boating and fishing. All of the various resorts on the lake are connected by steamboats.

The route from Westfield to Buffalo is a portion of the main transcontinental route from East to West, or vice versa. At Buffalo the tour turns back toward Philadelphia, touching at Silver Springs, near Silver lake, practically the most western of the chain of small lakes in central New York.

Portage has a history dating back to Indian days. The settlement was so named because of the fact that the Indians were compelled to carry their canoes around the falls of the Genesee river. At this point the river makes three separate falls, at some little distance apart, and offers a pleasing sight. A splendid railroad bridge now replaces the portage at a considerable height, giving a view of all three.

Dansville is in the centre of the hop growing country, and for miles the fields appear on either side of the road. A little later the tour enters the grape country, in the valley of the Canisteo river, and during the remainder of the distance into Elmira luscious fruit tempts the tourist on every hand. Incidentally, it may be stated that this district is some-

what noted for its wine cellars.

Beyond Bath is Corning, with its cut glass factories. Then comes an excellent macadam road, along the Chemung river into Elmira. This night stop first became a permanent settlement in 1788, and was incorporated as the village of Newton in 1815. The name was changed to Elmira in 1828. It is now the seat of Elmira College and other institutions of learning. Perhaps it is best known as the site of the state reformatory. Its chief industries are rolling mills, railroad car shops, steel bridge works, automobiles, etc.

For the first 20 miles beyond Elmira the tour lies along the Pennsylvania line, before it finally crosses it at Athens. From this point mountains begin to make their appearance. The route is along the Susquehanna river and

affords some excellent scenery all of the way. The Lehigh Valley railroad here winds its way among the peaks in a manner almost miraculous and adds its share to the general picturesqueness. Perhaps the view is at its best at Tunkhannock, but the tourist will find sufficient cause for rejoicing all the way.

The night stop is at Wilkesbarre, located in the Wyoming valley. This is the shipping point for the rich and extensive anthracite coal beds in this valley. It was founded in 1769 and occupies a commanding position in upper Pennsylvania. A short distance to the west is Eagles Mere, or the "Lake of the Eagles." This is situated 2200 feet above sea level and is embedded like a brilliant emerald among the virgin forests. It is 1.5 miles long and one mile wide, and in many places 60 feet deep. Excellent opportunity for bathing is afforded, the beaches being covered with clean, sloping white sand.

More mountains are encountered on the way back to Philadelphia, these being known as the Poconos, one of the groups which go to make up the Blue Ridge. They share with the Catskills and the mountains of West Virginia and North Carolina, an average altitude of 2000 feet, with heavily wooded slopes, through which brightly rushing streams leap from crag to crag. The end of the journey is over better known ways in the Delaware river valley over the latter portion of the route from Delaware Water Gap as listed in itinerary No. 61.



Colonnade and Pergola at Point Chautauqua, N. Y.

ITINERARY NO. 60.

Night Stops—Philadelphia, Gettysburg, Altoona, Pittsburg and Sheffield, Penn.; Buffalo and Elmira, N. Y.; Wilkesbarre, Penn. Eight Days, 999.8 Miles.

Philadelphia-Gettysburg, 118.7 Miles.

	Miles to	Total Miles	Out Return
Philadelphia	0.0	0.0	118.7
Ardmore	9.4	9.4	109.3
Bryn Mawr	2.1	11.5	107.2
Wayne	3.9	15.4	103.3
Devon	1.5	16.9	101.8
Berwyn	1.4	18.3	100.4
Daleford	1.2	19.5	99.2
Pallo	1.2	20.7	98.0

Fort Loudon	6.0	38.0	80.0
McConnellsburg	8.1	46.1	71.9
Harrisonville	6.4	52.5	65.5
Breesewood	11.4	63.9	54.1
Everett	8.4	72.3	45.7
Mt. Dallas	1.1	73.4	44.6
Bedford	6.7	80.1	37.9
St. Clansville	10.0	90.1	27.9
Osterburg	1.3	91.4	26.6
Claysburg	9.5	100.9	17.1
East Freedom	4.8	105.7	12.3
Newry	2.8	108.5	9.5
Duncansville	1.9	110.4	7.6
Altoona	7.6	118.0	0.0

Altoona-Pittsburg, 119.2 Miles.

	Miles to	Total Miles	Out Return
Altoona	0.0	0.0	119.2
Ashville	10.2	10.2	109.0
Cheat Springs	3.5	13.7	105.5
Carrolltown	6.8	20.5	98.7
Spangler	5.3	25.8	93.4
Barnsboro	1.5	27.3	91.9
North Barnsboro	0.4	27.7	91.5
Garman's Mills	1.7	29.4	89.8
Pine Flats	6.8	36.2	83.0
Kenwood	1.5	37.7	81.5

Saxonburg	7.4	30.7	103.3
Harmanton	2.1	32.8	101.1
Butler	9.1	41.9	92.0
Chicora	11.3	53.2	80.7
Kaylor	5.2	58.4	75.5
East Brady	4.5	62.9	71.0
Rimersburg	8.2	71.1	62.8
Curllsville	5.2	76.3	57.6
Reedsburg	4.0	81.2	52.7
Clarion	5.2	86.4	47.5
Lucinda	9.5	95.9	38.0
Snydersburg	1.8	97.7	36.2
Leeper	3.8	101.5	32.4
McDonald's	4.9	106.4	27.5
Marionville	7.0	113.4	20.5
Sheffield	20.5	133.9	0.0

Sheffield-Buffero, 118.4 Miles.

	Miles to	Total Miles	Out Return
Sheffield	0.0	0.0	118.4
Warren	12.6	12.6	105.8
North Warren	2.2	14.8	103.6
Russell, N. Y.	5.1	19.9	98.5
Jamestown	13.4	33.3	85.1
Stow	11.4	44.7	73.7
Chautauqua	5.2	49.9	68.5
Mayville	3.9	53.8	64.6



Eagles Mere, a Beautiful Lake and State Park of Virgin Forest Within Easy Driving Distance of Wilkesbarre.

Malvern	1.5	22.2	96.5
Whitford	7.4	29.6	89.1
Downington	3.3	32.9	85.8
Coatesville	6.6	39.5	79.2
Ladaburyville	3.9	43.4	75.3
Strasburg	10.2	53.6	65.1
Paradise	2.7	56.3	62.4
Lancaster	9.6	65.9	52.8
Columbia	10.2	76.1	42.6
Wrightsville	1.9	78.0	40.7
York	11.8	89.8	28.9
Thomasville	7.1	96.9	21.8
Abbotstown	7.7	104.6	14.1
New Oxford	4.2	108.8	9.9
Gettysburg	9.9	118.7	0.0

Gettysburg-Altoona, 118 Miles.

	Miles to	Total Miles	Out Return
Gettysburg	0.0	0.0	118.0
Seven Stars	3.9	3.9	114.1
McKnightstown	1.9	5.8	112.2
Cashtown	1.9	7.7	110.3
Fayetteville	11.4	19.1	98.9
Chambersburg	5.5	24.6	93.4
St. Thomas	7.4	32.0	86.0

Penn Run	4.1	41.8	77.4
Indiana	8.7	50.5	68.7
Homer City	5.8	56.3	62.9
Gracetown	2.8	59.1	60.1
Black Lack	3.4	62.5	56.7
Blairville	5.4	67.9	51.3
New Alexandria	9.4	77.3	41.9
Crabtree	3.3	80.6	38.6
Greensburg	6.1	86.7	32.5
Grapeville	4.1	90.8	28.4
Adamsburg	2.3	93.1	26.1
Irwin	3.0	96.1	23.1
Jacksonville	1.2	97.3	21.9
Circleville	0.6	97.9	21.3
E. McKeesport	5.8	103.7	15.5
Wilmerding	1.5	105.2	14.0
Wilkinsburg	6.7	111.9	7.3
Pittsburg	7.3	119.2	0.0

Pittsburg-Sheffield, 133.9 Miles.

	Miles to	Total Miles	Out Return
Pittsburg	0.0	0.0	133.9
Undercliff	10.7	10.7	123.2
Connersville	12.6	23.3	110.6

Westfield	5.4	59.2	59.2
Portland	6.0	65.1	52.3
Brocton	1.4	67.5	50.9
Fredonia	6.8	74.3	44.1
Sheridan	6.0	80.3	38.1
Silver Creek	5.9	86.2	32.2
Irving	2.4	88.6	29.8
Evans	7.6	97.2	21.2
Buffalo	21.2	118.4	0.0

Buffalo-Elmira, 154.6 Miles.

	Miles to	Total Miles	Out Return
Buffalo	0.0	0.0	154.6
Ebenezer	8.0	8.0	146.6
East Aurora	9.6	17.6	137.0
Wales Center	4.2	21.8	132.8
Harris	4.4	26.2	128.4
North Sheldon	2.8	29.0	125.6
Varysburg	4.2	33.2	121.4
Orangeville	3.4	36.6	118.0
Halls Corners	2.7	39.3	115.3
Warsaw	3.3	42.6	112.0
South Warsaw	3.0	45.6	109.0
Rock Glen	1.0	46.6	108.0
Silver Springs	2.8	49.4	105.2
Chace	1.3	50.7	103.9

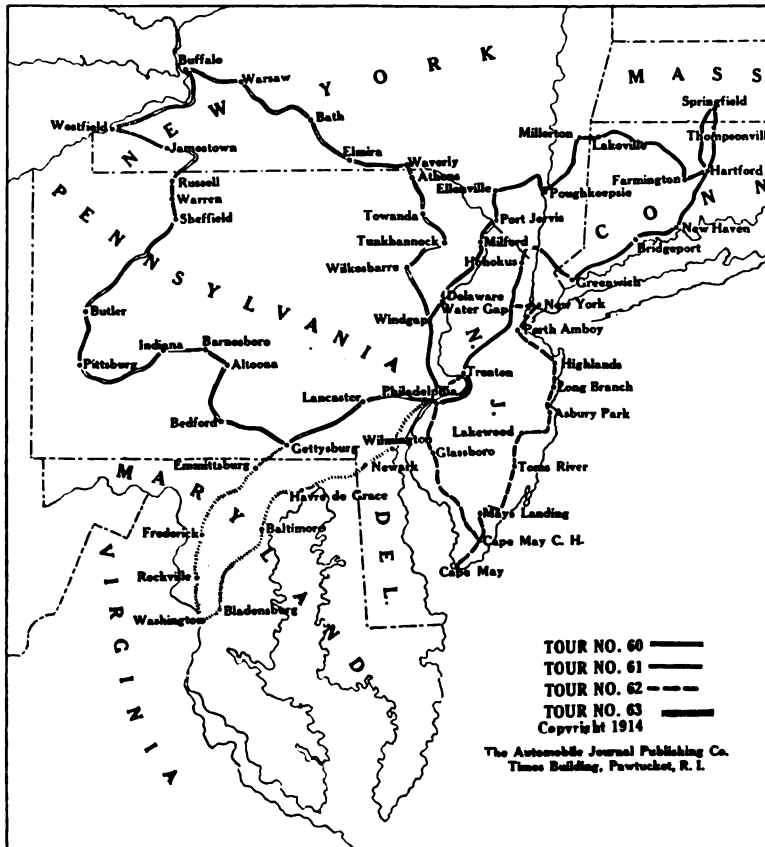
Castle	2.6	53.3	101.3	Kanona	4.2	110.4	44.2
Portageville	6.5	59.8	94.8	Bath	3.8	114.2	40.4
Hunts	4.3	64.1	90.5	Savona	6.5	120.7	33.9
Dalton	2.0	66.1	88.5	Campbell	4.5	125.2	29.4
Swains	7.6	73.7	80.9	Coopers	5.2	130.4	24.2
Garwoods	1.8	75.5	79.1				

Elmira-Wilkesbarre, 108.6 Miles.

	Miles to	Total Miles
	Out	Return
Elmira	0.0	0.0 108.6
Wellsburg	6.9	6.9 101.7
Chemung	7.2	14.1 94.5
Waverly	4.5	18.6 90.0
Athens, Penn.	3.6	22.2 86.4
Ulster	8.1	30.3 78.3
Towanda	8.1	38.4 70.2
Wyox	2.6	41.0 67.6
Standing Stone	4.2	45.2 63.4
Rummerfield	2.9	48.1 60.5
Wyalusing	7.1	55.2 53.4
Laceyville	8.4	63.6 45.0
Meshoppen	7.4	71.0 37.6
Russell Hill	3.7	74.7 33.9
Tunkhannock	5.3	80.0 28.6
Peterboro	8.5	88.5 20.1
Bowman Creek	2.9	91.4 17.2
Beaumont	2.1	93.5 15.1
Kunkle	2.4	95.9 12.7
Dallas Station	3.2	99.1 9.5
Luzerne	6.4	105.5 3.1
Wilkesbarre	3.1	108.6 0.0

Wilkesbarre-Philadelphia, 128.4 Miles.

	Miles to	Total Miles	
	Out	Return	
Wilkesbarre	0.0	0.0	128.4
Ashville Plains ..	5.2	5.2	123.3
Fairview	1.5	6.7	121.7
Bear Creek	10.0	16.7	111.7
Stoddardsville ...	9.2	25.9	102.5
Blakeslee	2.1	28.0	100.4
Pocono	4.3	32.3	96.1
Effort	9.8	42.1	86.3
Broadheadsville ..	2.7	44.8	83.6
Saylorsburg	6.0	50.8	77.6
Windgap	2.6	53.4	75.0
Windgap Village ..	2.4	55.8	72.6
Belfast	4.3	60.1	68.3
Nazareth	5.0	65.1	63.3
Bethlehem	9.6	74.7	53.7
Coopersburg	8.3	83.0	45.4
Quakertown	6.1	89.1	39.3
Sellersville	6.5	95.6	32.8
Montgomeryville ..	9.2	104.8	23.6
Springhouse	4.6	109.4	19.0
Ambler	2.3	111.7	16.7
National Ceme- tery	8.7	120.4	8.0
N. Philadelphia ..	5.0	125.4	3.0
Philadelphia	3.0	128.4	0.0



Canaseraga	2.3	77.8	76.8	Painted Post.	3.0	133.4	21.2
Danville	7.7	85.5	69.1	Corning	2.6	136.0	18.6
Perkinsville	4.3	89.8	64.8	Big Flats	7.1	143.1	11.5
Cohocton	8.8	98.6	56.0	Elmira Heights	8.3	151.4	3.2
Avoca	7.6	106.2	48.4	Elmira	3.2	154.6	0.0

OVER THE HILLS INTO NEW ENGLAND.

An Itinerary Outlined to Connect with Philadelphia and the South by Avoiding the Heavily Congested Traffic in New York City,

IN RESPONSE to the growing demand for an itinerary connecting New England with the South without the necessity for crossing New York City, that outlined herein has been selected as presenting features which will win instant approval. Many tourists, particularly women, find driving in the Metropolis to be a severe test of their nervous temperament. Tour No. 61 may be used in combination with any of the itineraries connecting these

two sections of the country.

Leaving Philadelphia, the way leads first to Camden, N. J., thence to Burlington, where Howe defeated Washington in 1777, resulting in the British occupancy of Philadelphia. Near here the Pennsylvania state fleet of 27 gunboats bravely fought the British squadron as it attempted to ascend the Delaware.

Bordentown was selected by Joseph Bonaparte, a brother of Napoleon, who made him king of

Naples, as a refuge after the disaster at Waterloo. He purchased an estate of 1400 acres, just north of the city and lived there until 1832. Later the state purchased the property and it is now known as Bonaparte park.

Beyond Trenton, the state capital, is Princeton, the site of Princeton University, founded in Elizabeth in 1746, and removed to this city in 1757. The battle of Princeton was one of the early and signal successes of Washing-

ton's campaign against the British. Nassau hall was utilized as a barracks for a time during the war and later the Continental Congress held sessions there.

The night stop is at Suffern, pleasantly situated among the Suffern hills, more of which are traversed the second day on the way into the valley of the Hudson, which is crossed by the Nyack ferry into Tarrytown. The route then leads across Westchester county into Connecticut.

Near Greenwich is an old cemetery where stood the church around which Gen. Israel Putnam and his band of 60 men fought off the British as long as possible, and then, since leaving by the highway would expose him to danger, he drove his horse down a flight of stone steps. The next day Gen. Putnam made a successful attack upon the enemy at Stamford.

This tour continues along the so-called shore line to Bridgeport and New Haven, passing a number of pleasantly situated seaside resorts, thence by way of North Haven with its many brickyards to Wallingford, famous for the part its silversmiths have played in the industrial history of the country. The hanging hills are passed on the way to Meriden, also well known in the silver business. West Peak, near by, commands a view extending from Hartford on the north to New Haven and over Long Island sound on the south.

Berlin is accredited with being the birthplace of the tin making industry in America, the first tinware having been produced here in 1775. For many years it was the home of a large number of tin peddlers who traversed the entire country from Mobile, Ala., to Montreal, Que.

The route from Hartford, the state capital, northward to Springfield, Mass., is on the east side of the Connecticut river, and the return is on the west side, thereby affording ample opportunity to enjoy the splendid roads and the particular beauty of the rich tobacco country. After the return to Hartford the tour turns westward along the Farmington river, through Satan's Kingdom with its wild tumbling waters, and into the Naugatuck valley at Winsted.

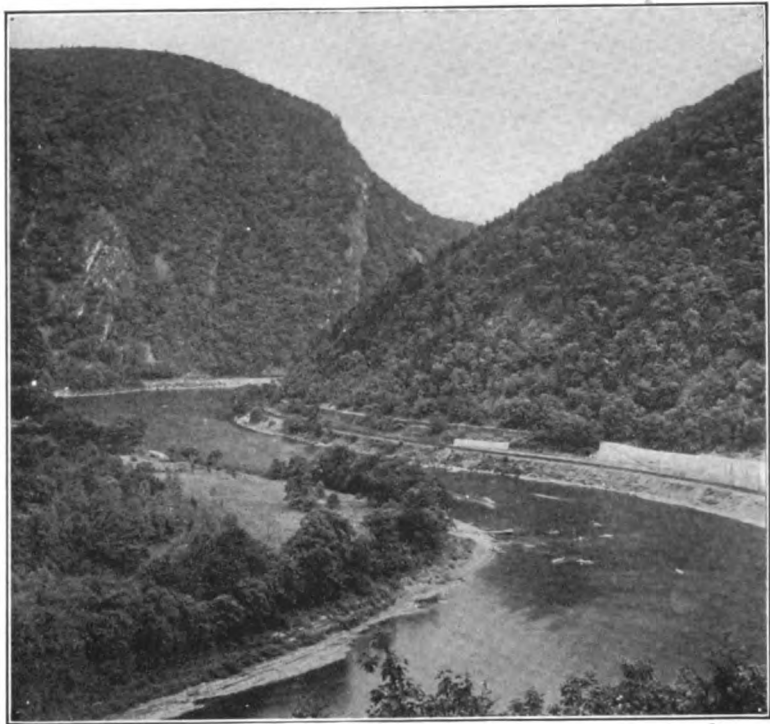
Then begins the ascent to Norfolk and Canaan, over some of the highest land in the state, and

with a sweeping view of the Berkshire hills to the north and the Litchfield hills to the south. Many caves of unknown extent are to be found in these hills, which overlook a number of pretty little lakes. At Salisbury, the iron mines will attract deserved attention. Lakeville shelters an interesting summer colony of New Yorkers. More iron mines are passed on the way to Sharon, and the tour then enters New York State, for the night stop at Poughkeepsie, the seat of Vassar College for young ladies.

Crossing the Hudson the itinerary enters some of the most inter-

many charming views of the section. Ellenville is located right under the shadow of the Shawangunk mountains, which rise to a height of 2500 feet and are crowned with castellated, massive bluffs, stretching for miles along their crest. Summitsville overlooks the entire length of the Mamakating valley.

Wurtsboro was first settled by the Dutch in 1660, and is surrounded by a number of lakes, which furnish excellent fishing grounds. The same may be said for Westbrookville and Cuddebackville, on the way to Port Jervis. The last named may be re-



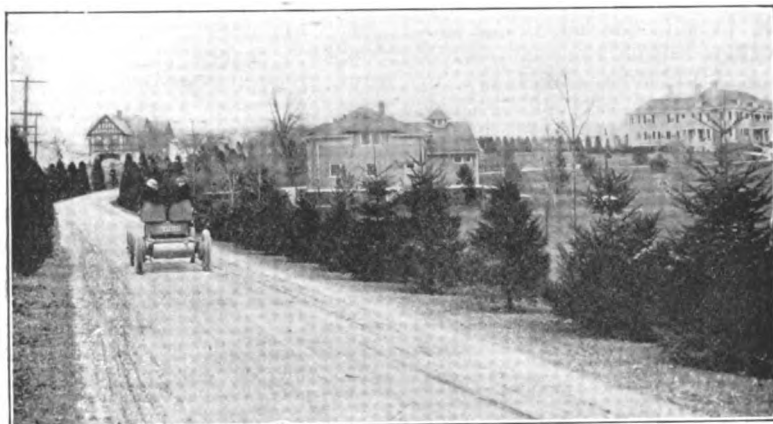
Mts. Tammany and Minsi in the Delaware Water Gap.

esting country in the vicinity of the Catskills. New Paltz, on the west bank of the Wallkill, was settled by Huguenot refugees from France in 1683. Many of its old stone houses, with high, steep pitched roofs, remain today much the same as when they were erected over 200 years ago. The surrounding country, with its smiling, well tilled fields and vine clad hillsides, still bears the imprint of the thrifty Frenchmen, who reclaimed it from the wilderness.

Napanoch is a favorite resort of artists, who take particular pleasure in transferring to canvas the

garded as the hub of the summer resort region. It is at the junction of three states—New York, Pennsylvania and New Jersey—this point being on a rock at the confluence of the Never Sink and Delaware rivers. Other points of interest are the old Barrett toll bridge and the Indian fort in the northern part of the town. Pretty drives may be taken into the Never Sink valley, Hawk Nest road and Saw Kill falls.

Dingman's Ferry is near Dingman's falls, the prettiest in Pike county. These are four in number, the highest being Soap-



Westchester County's Splendid Roads at Briarcliff Manor, N. Y.

Trough, while Silver Thread has a sheer drop of 150 feet. A thick growth of forest completely arches the falls, forming a sort of natural tunnel, up through which one may see only a scrap of blue sky.

At Delaware Water Gap, the Delaware river flows between two high mountains. That on the Pennsylvania side is named Minsi, but that on the Jersey shore has the more commanding cognomen of Tammany, although it goes without saying that such has not always been the case. The tops of these peaks are each over 1600 feet from the bed of the river.

Bethlehem offers much of historic interest, as well as considerable picturesque scenery, notably the very old Moravian school and cemetery, the latter with the grave of Uncas, mentioned in more detail elsewhere. Splendid views reward the tourist throughout the remainder of the distance into Philadelphia.

ITINERARY NO. 61.

Night Stops—Philadelphia, Penn.; Suffern, N. Y.; Springfield, Mass.; Poughkeepsie, N. Y.; Delaware Water Gap, Penn. Five Days, 594.6 Miles.

Philadelphia-Suffern, 130.3 Miles.

	Miles to	Total Miles
	Out Return	
Philadelphia	0.0	0.0 130.3
Camden, N. J.	1.3	1.3 129.0
Bridgeboro	12.3	13.6 116.7
Burlington	5.3	18.9 111.4
Columbus	7.3	26.2 104.1
Bordentown	5.4	31.6 98.7
Trenton	7.2	38.8 91.5

Lawrenceville ...	5.9	44.7	85.6
Princeton	5.1	49.8	80.5
Kingston	3.0	52.8	77.5
Franklin Park... ..	6.8	59.6	70.7
New Brunswick..	6.2	65.8	64.5
Metuchen	5.5	71.3	59.0
Iselin	2.1	73.4	56.9
Elizabeth	10.9	84.3	46.0
Newark	6.2	90.5	39.8
Passaic	9.5	100.0	30.3
Hoboken	10.5	110.5	19.8
Suffern, N. Y.	19.8	130.3	0.0

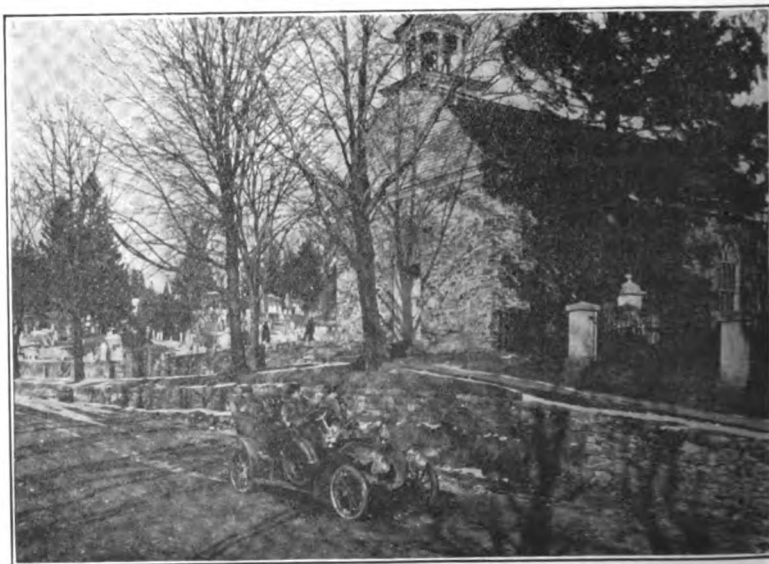
Suffern-Springfield, 140.4 Miles.

	Miles to	Total Miles
	Out Return	
Suffern	0.0	0.0 140.4
Spring Valley ...	5.9	5.9 134.5
Nanuet	2.4	8.3 132.1
Nyack	5.3	13.6 126.8
Tarrytown	0.7	14.3 126.1
Elmsford	3.3	17.6 122.8
White Plains ...	3.7	21.3 119.1
Port Chester	6.2	27.5 112.9
Greenwich, Conn.	3.1	30.6 109.8
Stamford	5.1	35.7 104.7
Darien	4.5	40.2 100.2
Norwalk	4.2	44.4 96.0

Westport	3.3	47.7	92.7
Fairfield	1.6	49.3	91.1
Bridgeport	4.5	53.8	86.6
Stratford	3.8	57.6	82.8
Milford	4.6	62.2	78.2
Woodmont	4.7	66.9	73.5
Savin Rock	4.0	70.9	69.5
West Haven	1.1	72.0	68.4
New Haven	3.6	75.6	64.8
North Haven	8.5	84.1	56.3
Wallingford	5.0	89.1	51.3
Tracy	3.3	92.4	48.0
Meriden	3.2	95.6	44.8
Berlin	6.1	101.7	38.7
Hartford	10.9	112.6	27.8
East Hartford... ..	1.6	114.2	26.2
South Windsor... ..	4.1	118.3	22.1
E. Windsor Hill... ..	3.5	121.8	18.6
Warehouse Point ..	5.1	126.9	13.5
Thompsonville ..	5.6	132.5	7.9
Longmeadow, Mass.	3.8	136.3	4.1
Springfield	4.1	140.4	0.0

Springfield-Poughkeepsie, 125 Miles.

	Miles to	Total Miles
	Out Return	
Springfield	0.0	0.0 125.0
Suffield, Conn.	10.4	10.4 114.0
Windsor Locks... ..	3.5	13.9 111.1
Windsor	5.6	19.5 105.5
Hartford	6.5	26.0 99.0
West Hartford... ..	3.6	29.6 95.4
Farmington	5.2	34.8 90.2
Unionville	3.8	38.6 86.4
Canton	4.6	43.2 81.8
Cherry Brook... ..	2.4	45.6 79.4
New Hartford... ..	4.2	49.8 75.2
Winsted	6.1	55.9 69.1
Norfolk	9.9	65.8 59.2
East Canaan... ..	5.0	70.8 54.3
Canaan	2.4	73.2 51.9
Salisbury	7.9	81.1 43.9
Lakeville	1.8	82.9 42.1
Millerton, N. Y. ...	3.9	86.8 38.2
Amenia	9.0	95.8 29.2
Lithgow	4.8	100.6 24.4
Mabettville	3.2	103.8 21.2
Millbrook Hollow	5.4	109.2 15.8
Washington Hol-		
low	3.9	113.1 11.9
Pleasant Valley... ..	4.8	117.9 7.1
Poughkeepsie ...	7.1	125.0 0.0



Washington Irving's Resting Place in Sleepy Hollow, New York.



Sanburg Creek in the Catskill Foothills, Near Ellenaville, N. Y.

Poughkeepsie-Delaware Water Gap, 108.6 Miles.

	Miles to	Total Miles
	Out	Return
Poughkeepsie ...	0.0	0.0 108.6
Highland ...	1.6	1.6 107.0
Lloyd ...	2.8	4.4 104.2
Ohioville ...	2.9	7.3 101.3

New Palts ...	1.7	9.0 99.6
Tillson ...	6.6	15.6 93.0
Lawrenceville ...	2.1	17.7 90.9
High Falls ...	2.8	20.5 88.1
Accord Village ...	7.8	28.3 80.3
Napanoch ...	9.2	37.5 71.1
Ellenville ...	2.0	39.5 69.1
Spring Glen ...	4.5	44.0 64.6
Phillipsport ...	2.2	46.2 62.4

Summitville ...	1.8	48.0 60.6
Wurtsboro ...	3.5	51.5 57.1
Westbrookville ...	4.9	56.4 52.2
Cuddebackville ...	4.6	61.0 47.6
Huguenot ...	3.5	64.5 44.1
Port Jervis ...	5.4	69.9 38.7
Milford, Penn... 6.0		75.9 32.7
Dingman's Ferry	8.5	84.4 24.2
Egypt Mills ...	8.4	92.8 15.8
Bushkill ...	3.4	96.2 12.4
Shoonmaker ...	1.8	98.0 10.6
Shawnee ...	7.2	105.2 3.4
Delaware Water Gap ...	3.4	108.6 0.0

Delaware Water Gap-Philadelphia, 90.3 Miles.

	Miles to	Total Miles
	Out	Return
Delaware Water Gap ...	0.0	0.0 90.3
Stormville ...	6.0	6.0 84.3
Saylorsburg ...	6.7	12.7 77.6
Windgap ...	2.6	15.3 75.0
Windgap Village ...	2.4	17.7 72.6
Belfast ...	4.3	22.0 68.3
Nazareth ...	5.0	27.0 63.3
Bethlehem ...	9.6	36.6 53.7
Coopersburg ...	8.3	44.9 45.4
Quakertown ...	6.1	51.0 39.3
Sellersville ...	6.5	57.5 32.8
Montgomeryville	9.2	66.7 23.6
Springhouse ...	4.6	71.3 19.0
Ambler ...	2.3	73.6 16.7
National Cemetery ...	8.7	82.3 8.0
N. Philadelphia ...	5.0	87.3 3.0
Philadelphia ...	3.0	90.3 0.0

ENCIRCLING THE STATE OF NEW JERSEY.

Following the Coast Line from New York to Cape May, Thence Along the Delaware Bay to Philadelphia and Return Over the Main Trunk Line.

SINCE New Jersey lifted the ban against non-resident automobile owners, motorists have found it rich touring ground. The itinerary presented herewith offers opportunity for visiting the entire coast line from New York City to Cape May, thence along Delaware bay to Philadelphia, and back to New York over the main

route across centre of the state.

The outward journey crosses Staten island and enters New Jersey at Perth Amboy. Red Bank, on the Navesink river, is a famous yachting resort. Long Branch is one of the best known watering places in the United States and derives its name from the "long branch" of the Shrews-

bury river near by. During President Grant's administration Long Branch was the summer capital, and President Garfield died in the cottage at Elberton.

Asbury Park is another popular seashore resort, adjoining which is Ocean Grove, once covered with the tents of the Methodist Association, but now the summer



Where the Delaware River Has Worn Its Way Through the Kittatinny Mountains at Delaware Water Gap.

headquarters of bishops and deacons. No intoxicating liquors are allowed on the grounds and on Sundays all traffic of whatever nature is prohibited.

Lakewood, in the heart of the pine woods, is a winter as well as a summer resort, and there are numerous drives in the pine forests of that section. Georgian Court, the summer residence of George Gould, with its famous Italian gardens, etc., is within easy driving distance.

Atlantic City is situated on Absecon island, a sandy strip separated from the main land by salt marshes. Perhaps it is the best known seaside resort in America and hundreds of thousands of tourists visit it annually. It has nearly 1000 hotels, with accom-

routes between the two cities, and offers a pleasant alternative to that given in itinerary No. 61 for those who desire to reach the New England territory and do not object to the congested traffic of the Metropolis.

ITINERARY NO. 62.

Night Stops—New York City;
Lakewood and Cape May, N.
J.; Philadelphia, Penn. Four
Days, 387.3 Miles.

New York-Lakewood, 70.6
Miles.

	Miles to	Total Miles
	Out	Return
New York	0.0	0.0
Tompkinsville ..	1.1	1.1
		69.5

Forked River...	9.3	19.1	110.5
Waretown	3.8	22.9	104.7
Barnegat	1.8	24.7	104.9
Manahawken ...	4.3	39.0	100.6
West Creek	4.9	33.9	95.7
Parkerton	0.7	34.6	95.0
Tuckerton	2.3	36.8	92.8
New Gretna.....	6.1	42.9	94.7
Port Republic...	6.6	49.5	90.1
Centerville	4.0	53.5	76.1
Absecon	3.9	57.4	72.2
Atlantic City....	8.9	66.3	63.3
Pleasantville ...	6.8	73.1	56.5
Idlewood	3.5	76.6	53.0
Mays Landing ..	9.2	85.8	43.8
Estelville	4.7	90.5	39.1
Tuckahoe	7.9	98.4	31.2
Petersburg	2.0	100.4	29.3
Seaville	5.1	105.5	24.1
Ocean View	2.3	107.8	21.8
Cape May C. H....	8.7	116.5	12.1
Cape May.....	13.1	129.6	0.0

Cape May-Philadelphia, 90.2
Miles.

	Miles to	Total Miles
	Out	Return
Cape May.....	0.0	0.0
		90.2



Atlantic City Possesses One of the Best Known Bathing Beaches and Recreation Spots in America.

modations for over 300,000 guests. Besides the famous board walk there are five piers extending into the ocean from 500 to 3000 feet, these being plentifully supplied with amusement pavilions, theatres, etc.

Cape May lies at the extreme southern end of the state, and was named for a Dutch navigator, Carolus Jacobsen Mey, who rounded the headland in 1623. Like Atlantic City, it has its board walk and piers, although on a somewhat smaller scale. The route from Cape May to Philadelphia lies through the rich market gardening country, which supplies the produce for that market.

The return to New York is over one of the most frequently used

New Dorp.....	5.5	6.6	64.0
Huguenot	5.4	12.0	58.6
Tottenville	3.4	15.4	55.2
Perth Amboy, N. J.....	0.6	16.0	54.6
South Amboy....	3.3	19.3	51.3
Morgan Station..	2.5	21.8	48.8
Keyport	3.9	25.7	44.9
New Monmouth..	6.3	32.0	38.6
Highlands	7.3	39.3	31.3
Seabright	2.2	41.5	29.1
Long Branch....	4.5	46.0	24.6
Deal	2.4	48.4	22.2
Asbury Park....	2.4	50.8	19.8
Belmar	2.2	53.0	17.6
Spring Lake....	2.2	55.2	15.4
Manasquan	2.1	57.3	13.3
Point Pleasant ..	3.3	60.6	10.0
Burrsville	4.6	65.2	5.4
Lakewood	5.4	70.6	0.0

Lakewood-Cape May, 129.6
Miles.

	Miles to	Total Miles
	Out	Return
Lakewood	0.0	0.0
Toms River	9.8	9.8
		119.8

Cape May C. H....	13.1	12.1	77.1
Goshen	4.2	17.3	72.9
Dennsville	4.7	22.0	68.3
Eldora	5.0	27.0	63.3
Port Elizabeth..	10.8	37.8	53.4
Millville	6.6	44.4	46.6
Vineland	7.5	51.9	38.3
North Vineland..	2.8	54.7	35.5
Newfield	1.3	56.0	34.3
Malaga	2.6	58.6	31.6
Franklinville ...	3.4	62.0	28.3
Clayton	2.8	64.8	25.4
Glassboro	3.1	67.9	22.3
Pitman Grove....	2.4	70.3	19.9
Woodbury	8.3	78.6	11.6
Gloucester	3.8	82.4	7.8
Camden	5.8	88.2	2.0
Philadelphia	2.0	90.2	0.0

Philadelphia-New York, 96.9
Miles.

	Miles to	Total Miles
	Out	Return
Philadelphia	0.0	0.0
Agonts	8.9	8.9
Buxton	7.3	16.2
La Trappe	5.1	21.3
		75.6

Langhorne	4.4	25.7	71.3	Kingston	3.0	49.1	47.8	Elizabeth	10.9	80.6	16.3
Glen Lake	1.3	27.0	69.9	Franklin Park...	6.8	55.9	41.0	West Elizabeth..	2.0	82.6	14.3
Trenton, N. J....	8.1	35.1	61.8	New Brunswick..	6.2	62.1	34.8	Newark	4.2	86.8	10.1
Lawrenceville ..	5.9	41.0	55.9	Metuchen	5.5	67.6	29.3	Jersey City.....	10.1	96.9	0.0
Princeton	5.1	46.1	50.8	Iselin	2.1	69.7	27.2	Ferry to New York.			

CROSSING THE MASON AND DIXON LINE.

A Three-Day Tour Designed to Afford Connections Between Washington, Philadelphia and Gettysburg, and Between the North and South.

OFFERED as the connecting link between the South and the North, itinerary No. 63 starts from Washington and visits Philadelphia and Gettysburg. It thus provides two means of communication between these two sections of the country, either of which may be followed with profit by the tourist who enjoys interesting scenery and good roads.

As outlined, the route from Washington to Philadelphia follows the main trunk line through Baltimore, Md., and Wilmington, Del. Good macadam marks a major portion of the way. Baltimore is one of the chief oyster packing centres of the world. It is a manufacturing city of importance and has a number of fine public buildings. Druid park, a 700-acre plot, with varied native forests, is beautifully laid out and contains a number of fine drives.

At Havre de Grace, the Susquehanna river is a full mile wide. At Perryville the road crosses a long railroad span, which has been transformed into a highway. Wilmington is noted for its parks, one of which is located in the Glen of the Brandywine, a name which is familiar to students of the Revolution, and another is Rockford park, where a handsome statue of Thomas F. Bayard is to be seen. Here also are to be found the famous Dupont powder works. The old Swedes Church was built in 1698 by the first Swedish colony to locate in America.

The route from Philadelphia to Gettysburg is identical with that offered for the first day in itinerary No. 60.

Emmitsburg, just across the Mason and Dixon line, is the seat of Mt. St. Mary's College, a Catholic institution, which was founded in 1808, and which has a reputation that is world wide. The Mother House of the Sisters of

Charity is two miles distant.

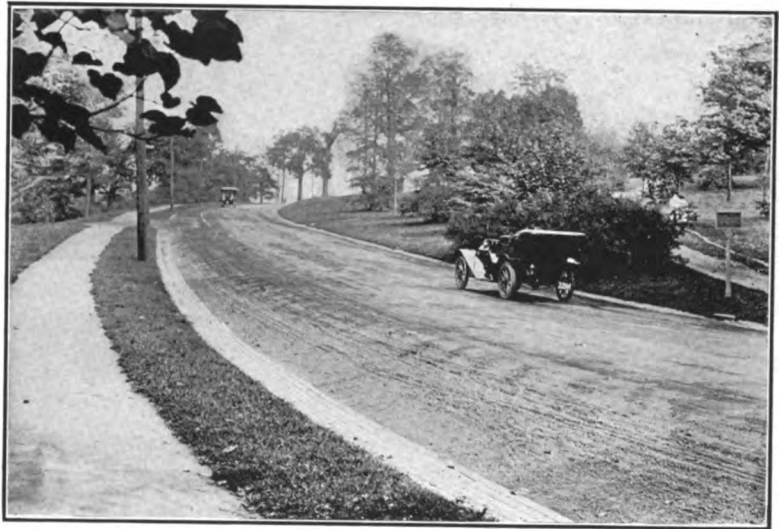
Frederick, laid out in 1745, is in the centre of a rich limestone plain near the Catochin mountains, thus accounting for Whittier's "Green-walled by the hills of Maryland," in "Barbara Frietchie." The city was the terminus of a railroad opened in 1830, the grading work for which was done by Charles Carroll of Carrollton, then the only living signer of the Declaration of Independence. It was at Frederick that Lee established himself after defeating Mc-

ITINERARY NO. 63.

Night Stops—Washington, D. C.; Philadelphia and Gettysburg, Penn. Three Days, 348.8 Miles.

Washington-Philadelphia, 152.4 Miles.

	Miles to	Total Miles
	Out	Return
Washington	0.0	0.0
Blagdenburg, Md. 6.9	6.9	145.5
Beltville	7.2	14.1
		138.3



One of the Interesting Automobile Drives Seen in Fairmount Park, Philadelphia.

Clellan in 1862 and called upon the people of Maryland to rise against the Union. The people refused to obey and McClellan was able to dislodge him with 70,000 men. Francis Scott Key, the author of "The Star Spangled Banner," is buried in Mt. Olivet cemetery.

The remainder of the trip into the National Capital is over good macadam road and through interesting historic country.

Laurel	6.0	20.1	132.3
Elk Ridge	10.7	30.8	121.6
Relay	1.3	32.1	120.3
Cantonsville	3.7	35.8	116.6
Baltimore	8.2	44.0	108.4
Towson	8.8	52.8	99.6
Lock Raven	4.2	57.0	95.4
Glenarm	3.7	60.7	91.7
Bel Air	10.4	71.1	81.3
Churchville	5.5	76.6	75.8
Havre de Grace..	9.9	86.5	65.9
Perryville	1.5	88.0	64.4
Northeast	7.4	95.4	57.0
Elkton	6.2	101.6	50.8
Newark, Del.....	7.1	108.7	43.7
Marshallton	7.9	116.6	35.8
Elsmere Junction	2.6	119.2	33.2

Wilmington	2.7	121.9	30.5
Chelsea, Penn.	9.7	131.6	20.8
Darby	14.1	145.7	6.7
Philadelphia	6.7	152.4	0.0

Philadelphia-Gettysburg, 118.7
Miles.

(For routing see Itinerary No. 60.)

Gettysburg-Washington, 77.7
Miles.

	Miles to	Total Miles	Out Return
Gettysburg	0.0	0.0	77.7
Emmitsburg, Md.	10.3	10.3	67.4

Thurmont	8.0	18.3	59.4
Lewistown	6.6	24.9	52.8
Frederick	9.3	34.2	43.5
Hyattstown	11.3	45.5	32.2
Clarksburg	3.9	49.4	28.3
Gaithersburg	8.1	57.5	20.2
Rockville	5.2	62.7	15.0
Bethesda	11.9	74.6	2.1
Washington, D. C.	3.1	77.7	0.0

DELIGHTFUL TOURS IN THE SOUTHLAND.

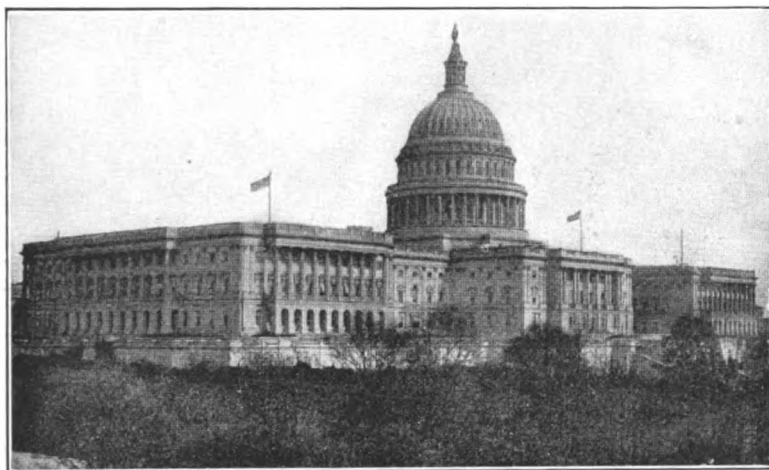
Washington-Atlanta-Tuscumbia-Nashville-Louisville-Cincinnati-Wheeling-Pittsburg-
Washington-Atlanta-Savannah-Jacksonville-Tuscumbia-Memphis-New Orleans.

ROAD conditions in the South have improved decidedly since the running of the 1911 Glidden tour, and it must not be forgotten that the Atlanta-New York tours of 1909 and 1910 did their full share to bring the value of improved ways to the attention of the people in this district. The main itinerary outlined herein, No. 100, combines a portion of the 1911 Glidden tour along the Atlantic seaboard, with a portion of the 1910 Glidden in Tennessee and Kentucky. It is anticipated

100, the remainder of the route will be found to afford what is regarded as the best means of getting into Jacksonville by automobile. While some of the roads are not to be considered ideal, it may be suggested that there are drives in and out of Jacksonville which are the equal of those in any section of the country. Itinerary No. 102 takes the tourist to New Orleans and the same thing holds true of this in a measure. The Louisiana cities hold much of interest for the tourist passing

ITINERARY NO. 100.

Night Stops—Washington, D. C.; Richmond, Va.; Henderson, Winston-Salem and Charlotte, N. C.; Greenville, S. C.; Atlanta, Ga.; Birmingham and Tuscumbia, Ala.; Nashville, Tenn.; Mammoth Cave and Louisville, Ky.; Cincinnati and Zanesville, O.; Pittsburg, Penn.; Cumberland, Md. Sixteen Days, 2150.2 Miles.



The National Capitol Building at Washington, D. C.

that the tourist will take up this routing at Washington, D. C., and return to that point by way of the Middle West. It may be added that this itinerary furnishes connecting links in two transcontinental tours.

Itinerary No. 101 is given for those who desire to reach Jacksonville, Fla. The start may be made from any point in the North, or any other section of the country for that matter. After reaching Atlanta over itinerary No.

through that section of country.

Respecting the main tour, it may be added that the route lies through some of the richest historic sections in the South, with splendid views on the way to Atlanta from Washington, and again in Tennessee and Kentucky. The return to Washington from Louisville follows somewhat closely the old national highway in places. There ought to be little difficulty experienced in making the daily mileage as outlined.

Washington-Richmond, 121.6
Miles.

	Miles to	Total Miles	Out Return
Washington	0.0	0.0	121.6
Alexandria, Va.	7.2	7.2	114.4
Lorton	12.2	19.4	102.2
Ocequan	3.5	22.9	98.7
Dumfries	10.7	33.6	88.0
Stafford	16.4	50.0	71.6
Fredericksburg	9.4	59.4	62.2
Massaponax	9.4	68.8	52.8
Castelman's Mill	5.9	74.7	46.9
Golansville	13.2	87.9	33.7
Ashland	16.4	104.3	17.3
Richmond	17.3	121.6	0.0

Richmond-Henderson, 145.9
Miles.

	Miles to	Total Miles	Out Return
Richmond	0.0	0.0	145.9
Petersburg	22.7	22.7	123.2
Carson	14.9	37.6	108.3
Loco	14.0	51.6	94.3
Jarrat	5.8	57.4	88.5
Emporia	9.9	67.3	78.6
Brink	7.7	75.0	70.9
Barley	6.9	81.9	64.0
Roanoke Rapids, N. C.	11.8	93.7	52.2
Holden	2.4	96.1	49.8
Thelma	6.7	102.8	43.1
King's Cross Roads	1.1	103.9	42.0
Sunlight	1.3	105.2	40.7
Littleton	5.3	110.5	35.4
Vaughan	5.8	116.3	29.6
Macon	5.4	121.7	24.2
Warrenton	5.7	127.4	18.5
Afton	4.8	132.2	13.7
Henderson	13.7	145.9	0.0

Henderson — Winston-Salem, 148.5 Miles.

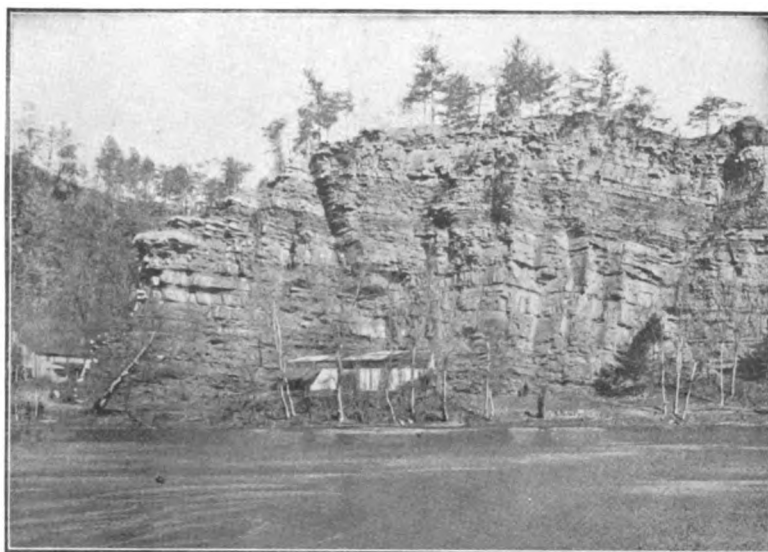
	Miles to	Total Miles Out Return
Henderson	0.0	0.0 148.5
Oxford	11.7	11.7 136.8
Providence	5.7	17.4 131.1
Tallyho	5.2	22.6 125.9
Stem	1.3	23.9 124.6
Knapp of Reeds	4.7	28.6 119.9
Bragtown	11.6	40.2 108.3
Durham	3.3	43.5 105.0
Chapel Hill	12.1	55.6 92.9
White Cross	9.0	64.6 83.9
Saxapahaw	9.7	74.3 74.2
Graham	12.1	86.4 62.1
Burlington	2.9	89.3 59.2
Gibsonville	6.7	96.0 52.5
Whitsett Cross Roads	2.7	98.7 49.8
Greensboro	13.6	112.3 36.2
Gulldford	5.7	118.0 30.5
Summerfield	6.7	124.7 23.8
Kernersville	11.7	136.4 12.1
Centerville	9.8	146.2 2.3
Winston-Salem	2.3	148.5 0.0

Winston-Salem — Charlotte, 81.5 Miles.

	Miles to	Total Miles Out Return
Winston-Salem	0.0	0.0 81.5
Midway	13.7	13.7 67.8
Brinkleys	3.2	16.9 64.6
Lexington	7.0	23.9 57.6
Spencer	14.6	38.5 43.0
Salisbury	2.8	41.3 40.2
China Grove	2.8	44.1 37.4
Landis	2.4	46.5 35.0
Kanapolis	4.7	51.2 30.3
Concord	7.9	59.1 22.4
Pharr's Mill	6.2	65.3 16.2
Newell	8.4	73.7 7.8
Charlotte	7.8	81.5 0.0

Charlotte-Greenville, 117.3 Miles.

	Miles to	Total Miles Out Return
Charlotte	0.0	0.0 117.3
Sloane's Ferry	10.9	10.9 106.4
Belmont	1.7	12.6 104.7
Lowell	4.7	17.3 100.0
Gastonia	5.5	22.8 94.5
Bessemer City	6.8	29.6 87.7
King's Mountain	6.0	35.6 81.7
Grover	8.1	43.7 73.6
Blacksburg, S. C.	6.3	50.0 67.3

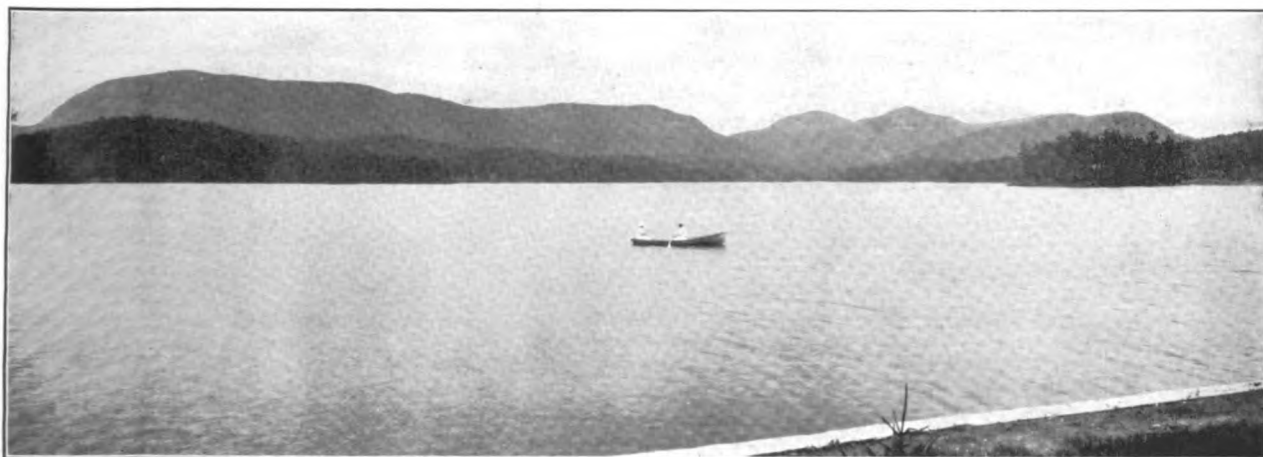


Paint Rocks, French Broad River, North Carolina, One of the Most Interesting Monuments on the American Continent.

Gaffney	9.1	59.1	58.2	Apple Valley	4.5	110.2	69.5
Cowpens	11.9	71.0	46.3	Jefferson	4.9	115.1	55.6
Converse	3.1	74.1	43.2	Winder	3.6	118.7	52.0
Spartanburg	6.4	80.5	36.8	Carl	6.0	124.7	46.0
Fair Forest	5.3	85.8	31.5	Lawrenceville	12.3	137.0	33.7
Tucapau	6.5	92.3	25.0	Snellville	7.4	144.4	26.3
Duncan	4.6	96.9	20.4	Stone Mountain	10.4	154.8	15.9
Greer	5.1	102.0	15.3	Clarkson	5.0	159.8	10.9
Taylors	5.6	107.6	9.7	Scottdale	2.1	161.9	8.8
Greenville	9.7	117.3	0.0	Inglewood	1.1	163.0	7.7
Greenville-Atlanta, 170.7 Miles.				Decatur	1.6	164.6	6.1
				Kirkwood	1.9	166.5	4.2
				Atlanta	4.2	170.7	0.0

Atlanta-Birmingham, 190.2 Miles.

	Miles to	Total Miles Out Return
Atlanta	0.0	0.0 190.2
Mableton	13.2	13.2 177.0
Austel	3.6	16.8 173.4
Lithia Springs Station	2.6	19.4 170.8
Douglasville	6.4	25.8 164.4
Winston	5.2	31.0 159.2
Villa Rica	5.7	36.7 153.5
Temple	8.7	45.4 144.8

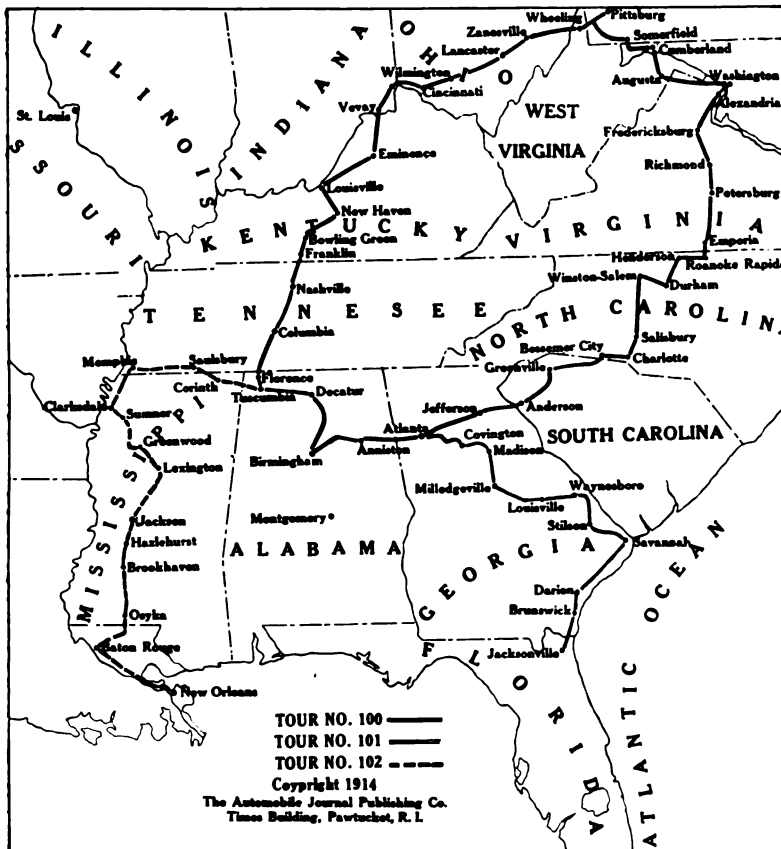


One of the Pretty Little Lakes in the Blue Ridge Mountains of North Carolina—Photo by Great Southern Railway.



Andrews Geyser, Half Hidden Among the Mountains, on the Great Southern Railway's Route to Asheville, N. C.

Bremen	7.8	53.2	137.0	Springville	4.7	161.1	29.1	Cleveland	7.0	39.8	99.2
Waco	2.7	55.9	134.3	Argo	6.4	107.5	22.7	Blountsville	8.1	47.9	91.1
Tallapoosa	7.4	63.3	126.9	Trussville	7.9	175.4	14.8	Berlin	13.7	61.6	77.4
Edwardsville, Ala.	17.2	80.5	100.7	Gate City	8.9	184.3	5.9	Cullman	5.2	66.8	72.2
Heflin	6.2	86.7	103.5	Birmingham	5.9	190.2	0.0	Hartselles	22.3	89.1	49.9
Iron City	6.7	93.4	96.8	Birmingham-Tuscumbia, 139				Decatur	6.9	96.0	43.0
Choccolocco	2.4	95.8	94.4	Miles.				Trinity	6.1	102.1	36.9
De Armanville	6.3	102.1	88.1					Hillaboro	5.8	107.9	31.1
Oxford	2.7	104.8	85.4					Wheeler	3.9	111.8	27.2
Oxanna	1.8	106.6	83.6					Courtland	3.1	114.9	24.1
Anniston	1.4	108.0	82.2					Town Creek	6.1	121.0	18.0
Peaks Hill	17.5	125.5	64.7					Leighton	7.1	128.1	10.9
Greensport	7.8	133.3	56.9					Tuscumbia	10.9	139.0	0.0
Asheville	12.5	145.8	44.4					Tuscumbia-Nashville, 121.9			
St. Claire								Miles.			
Spring	10.6	156.4	33.8								



	Miles to	Total Miles
Tuscumbia	0.0	0.0
Sheffield	2.2	121.9
Florence	4.5	119.7
St. Florian	6.2	115.2
Green Hill	10.8	109.0
Loretto, Tenn.	7.9	23.7
Pleasant Point	5.8	31.6
Leoma	2.2	37.4
Dunn	1.9	39.6
Lawrenceburg	3.5	41.5
Summertown	13.9	45.0
Crestview	1.2	58.9
Williamsville	4.2	60.1
Sandy Hook	0.8	64.3
Mt. Pleasant	4.0	65.1
Ridley	1.5	69.1
Columbia	9.8	70.6
Neapolis	7.5	80.4
Brentwood	25.1	87.9
Nashville	8.9	113.0

Nashville-Mammoth Cave,
103.2 Miles.

	Miles to	Total Miles
Nashville	0.0	0.0
Goodlettsville	13.1	103.2
White House	12.9	13.1
Franklin, Ky.	20.5	26.0
Bowling Green	10.3	46.5
Glasgow Junction	35.2	56.8
Mammoth Cave	11.2	92.0

Mammoth Cave—Louisville,
116.2 Miles.

	Miles to	Total Miles
Mammoth Cave	0.0	0.0
Cave City	10.4	116.2
Bear Wallow	6.4	105.8
Uno	4.4	16.8
Hardyville	4.4	21.2
Canmer	2.9	75.6

Magnolia	13.0	41.5	74.7
Buffalo	5.6	47.1	69.1
Athertonville	1.9	49.0	67.2
New Haven	12.1	61.1	55.1
Bardstown	14.7	75.8	40.4
Mt. Washington	19.7	95.5	20.7
Louisville	20.7	116.3	0.0

Louisville-Cincinnati, 136.1

Miles.

		Total Miles	
		Miles to	Out Return
Louisville	0.0	0.0	136.1
St. Mathews	6.2	6.2	129.9
Middletown	6.3	12.5	123.6
Eastwood	5.1	17.6	118.5
Simpsonville	5.5	23.1	113.0
Shelbyville	7.5	30.6	105.5
Eminence	11.6	42.2	93.9
Newcastle	4.4	46.6	89.5
Campbellsburg	6.7	53.3	82.8
Carrollton	12.8	66.1	70.0
Vevay, Ind.	8.9	75.0	61.1
Markland	4.9	79.9	56.2
East Enterprise	6.9	86.8	49.3
Oberdeen	2.2	89.0	47.1
Rising Sun	9.4	98.4	37.7

Washington C. H.	10.9	68.8	84.5
New Holland	9.5	78.3	75.0
Williamsport	7.5	85.8	67.5
Circleville	9.3	95.1	58.2
Amanda	11.5	106.6	46.7
Lancaster	9.3	115.9	37.4
Colfax	5.6	121.5	31.8
West Rushville	3.3	124.8	28.5
Rushville	1.1	125.9	27.4
Somersett	7.6	133.5	19.8
Sego	5.6	139.1	14.2
Fultonham	3.8	142.9	10.4
East Fultonham	0.8	143.7	9.6
South Zanesville	6.9	150.6	2.7
Zanesville	2.7	153.3	0.0

Zanesville-Pittsburg, 134.4

Miles.

		Total Miles	
		Miles to	Out Return
Zanesville	0.0	0.0	134.4
Norwich	11.9	11.9	122.5
New Concord	3.2	15.1	119.3
Cambridge	8.3	23.4	111.0
Washington	8.4	31.8	102.6
Elizabethtown	6.0	37.8	96.6

Washington	8.8	29.4	99.9
Scenery Hill	12.5	41.9	87.4
Beallsville	3.4	45.3	84.0
Centerville	2.9	48.2	81.1
Brownsville	5.5	53.7	75.6
Davidson	3.4	57.1	72.2
Haddonfield	5.7	62.8	66.5
Uniontown	3.4	66.2	63.1
Hopwood	2.6	68.8	60.5
Fayette Springs	5.1	73.9	55.4
Farmington	3.7	77.6	51.7
Somerfield	10.8	88.4	40.9
Addison	5.4	93.8	35.5
Oakton	1.1	94.9	34.4
Keyser, Md.	3.4	98.3	31.0
Grantsville	5.3	103.6	25.7
Frostburg	14.1	117.7	11.0
Elkhart Mines	1.8	119.5	9.8
Cumberland	9.8	129.3	0.0

Cumberland-Washington, 141.1

Miles.

		Total Miles	
		Miles to	Out Return
Cumberland	0.0	0.0	141.1



Indicating Character of Roads to Be Encountered in Vicinity of Savannah, Ga., and the Typical Southern Foliage.

Aurora	8.4	106.8	29.3	Fairview	5.6	43.4	91.0	S. Cumberland	2.0	2.0	139.1
Lawrenceburg	3.8	110.6	25.5	Hendricksburg	3.4	46.8	87.6	Frankford, W. Va.	11.1	13.1	128.0
Homestead	2.1	112.7	23.4	Morristown	5.7	52.5	81.9	Springfield	5.8	18.9	122.2
Elizabethtown	3.8	116.5	19.6	Loydsville	3.8	56.3	78.1	Wappocomo	2.0	20.9	120.2
Cleves, O.	3.5	120.0	16.1	St. Clairsville	5.2	61.5	72.9	Romney	7.1	28.0	113.1
Mack	6.7	126.7	9.4	Bridgeport	9.7	71.2	63.2	Frenchburg	7.2	35.2	105.9
Cincinnati	9.4	136.1	0.0	Wheeling, W. Va.	1.2	72.4	62.0	Augusta	2.0	37.2	103.9
Cincinnati-Zanesville, 153.3				Elm Grove	6.3	78.7	55.7	Pleasantdale	3.8	41.0	100.1
Miles.				West Alexander, Penn.	10.4	89.1	45.3	Hanging Rock	3.2	44.2	96.9
				Claysville	5.9	95.0	39.4	Capon Bridge	6.9	51.1	90.0
				Washington	10.0	105.0	29.4	Parishville	5.3	56.4	84.7
				Cannonsburg	8.8	113.8	20.6	Gore	1.8	58.2	82.9
				Bridgeville	9.4	123.2	11.2	Hayfield	4.4	62.6	78.5
				Carnegie	4.1	127.3	7.1	Chambersville	4.1	66.7	74.4
				Pittsburg	7.1	134.4	0.0	Winchester, Va.	4.3	71.0	70.1
				Pittsburg-Cumberland, 129.3				Berryville	11.1	82.1	59.0
				Miles.				Round Hill	11.8	93.9	47.2
								Purcellville	3.6	97.5	43.6
								Hamilton	2.8	100.3	40.8
								Leesburg	6.4	106.7	34.4
								Falls Church	26.7	133.4	7.7
								Ballston Spa	4.8	138.2	2.9
								Washington, D. C.	2.9	141.1	0.0

		Total Miles	
		Miles to	Out Return
Cincinnati	0.0	0.0	153.3
Norwood	5.6	5.6	147.7
Pleasant Ridge	2.2	7.8	145.5
Silverton	1.5	9.3	144.0
Montgomery	3.6	12.9	140.4
Fosters	9.1	22.0	131.3
Hopkinsville	2.2	24.2	129.1
Morrow	5.1	29.3	124.0
Rochester	1.8	31.1	122.2
Clarksville	7.1	38.2	115.1
Sligo	4.2	42.4	110.9
Wilmington	5.0	47.4	105.9
Sabina	10.5	57.9	95.4

		Total Miles	
		Miles to	Out Return
Pittsburg	0.0	0.0	129.3
Carnegie	7.1	7.1	122.2
Bridgeville	4.1	11.2	118.1
Cannonsburg	9.4	20.6	108.7

		Total Miles	
		Miles to	Out Return
Pittsburg	0.0	0.0	129.3
Carnegie	7.1	7.1	122.2
Bridgeville	4.1	11.2	118.1
Cannonsburg	9.4	20.6	108.7

ITINERARY NO. 101.

Night Stops—Atlanta, Milledgeville, Savannah and Brunswick, Ga.; Jacksonville, Fla., and Return. Four Days, 476.3 Miles.

Atlanta-Milledgeville, 117.8 Miles.

	Miles to	Total Miles	Out Return
Atlanta	0.0	0.0	117.8
Decatur	7.9	7.9	109.9
Ingleside	1.6	9.5	108.3
Scottsdale	2.2	11.7	106.1
Clarkson	1.1	12.8	105.0
Stone Mountain	5.1	17.9	99.9
Redam	5.2	23.1	94.7
Luthonia	3.6	26.7	91.1
Conyers	6.6	33.3	84.5
Covington	11.4	44.7	73.1

Savannah 9.7 182.0 0.0

Savannah-Brunswick, 77 Miles.

	Miles to	Total Miles	Out Return
Savannah	0.0	0.0	77.0
Freedman's Grove	27.0	27.0	50.0
Riceboro	7.5	34.5	42.5
Eulonia	17.0	51.5	25.5
Darien	11.5	63.0	14.0
Brunswick	14.0	77.0	0.0

Brunswick-Jacksonville, 99.5 Miles.

	Miles to	Total Miles	Out Return
Brunswick	0.0	0.0	99.5
Old Sterling	10.5	10.5	89.0
Brookman	10.5	21.0	78.5
Tarboro	19.7	40.7	58.8
Owen's Ferry	3.5	44.2	55.3
King's Ferry	14.3	58.5	41.0
Callahan	18.5	77.0	22.5
Jacksonville	22.5	99.5	0.0

Saulsbury	7.5	100.6	58.5
Grand Junction	6.9	107.5	51.9
La Grange	3.5	111.0	48.4
Moscow	9.8	120.8	38.6
Rossville	8.4	129.3	30.3
Piperton	4.3	133.4	26.0
Collierville	2.5	135.9	23.5
Germantown	8.9	144.8	14.6
Whites	5.2	150.0	9.4
Aulon	4.1	154.1	5.3
Memphis	5.3	159.4	0.0

Memphis-Sumner, 120 Miles.

	Miles to	Total Miles	Out Return
Memphis	0.0	0.0	120.0
Lynchburg, Miss.	15.0	15.0	105.0
Glover	5.7	20.7	99.3
Lake Cormorant	3.7	24.4	95.6
Clacks	6.8	31.2	88.8
Robinsonville	3.8	35.0	85.0
Hollywood	7.0	42.0	78.0
Tunica	4.5	46.5	73.5
Clayton	8.7	55.2	64.8
Dundee	7.2	62.4	57.6
Lula	6.8	69.2	50.8
Rich	3.5	72.7	47.3
Coahoma	6.7	79.4	40.6
Cloverhill	7.8	87.2	32.8
Clarksdale	6.1	93.3	26.7
Tutwiler	20.9	114.2	5.8
Sumner	5.8	120.0	0.0

Sumner-Jackson, 165.5 Miles.

	Miles to	Total Miles	Out Return
Sumner	0.0	0.0	165.5
Whitehead	13.0	13.0	152.5
Glendora	1.8	14.8	150.7
Black Bayou	1.7	16.5	149.0
Schlater	11.5	28.0	137.5
Greenwood	22.5	50.5	115.0
Lexington	40.2	90.7	74.8
Franklin	8.0	98.7	66.8
Goodman	8.5	107.2	58.3
Pickens	8.5	115.7	49.8
Canton	23.2	138.9	26.6
Guckstadt	9.2	148.1	17.4
Madison	4.3	152.4	13.1
Ridgeland	2.3	154.7	10.8
Tougaloo	2.5	157.2	8.3
Jackson	8.3	165.5	0.0

Jackson-Baton Rouge, 179 Miles.

	Miles to	Total Miles	Out Return
Jackson	0.0	0.0	179.0
Terry	17.3	17.3	161.7
Crystal Springs	9.1	26.4	152.6
Haslehurst	9.6	36.0	143.0
Beauregard	11.8	47.8	131.2
Wesson	1.7	49.5	129.5
Brookhaven	9.9	59.4	119.6
Norfield	7.4	66.8	112.3
Johnston	10.9	77.7	101.3
Oyaka	28.5	106.2	72.8
Kentwood, La.	5.5	111.7	67.3
Greensburg	17.3	129.0	50.0
Baton Rouge	50.0	179.0	0.0

Baton Rouge-New Orleans, 119 Miles.

	Miles to	Total Miles	Out Return
Baton Rouge	0.0	0.0	119.0
Darrow	43.5	43.5	75.5
La Place	41.0	84.5	34.5
Kenner	23.0	107.5	11.5
New Orleans	11.5	119.0	0.0



The Old Absinthe House, One of the Ancient Landmarks in New Orleans.

ITINERARY NO. 102.

Night Stops—Tuscumbia, Ala.; Memphis, Tenn.; Sumner and Jackson, Miss.; Baton Rouge and New Orleans, La., and Return. Five Days, 742.9 Miles.

Tuscumbia-Memphis, 159.4 Miles.

Social Circle	11.8	56.5	61.3
Rutledge	7.3	63.8	54.0
Madison	9.7	73.5	44.3
Eatonton	22.7	96.2	21.6
Milledgeville	21.6	117.8	0.0

Milledgeville-Savannah, 182 Miles.

	Miles to	Total Miles	Out Return
Milledgeville	0.0	0.0	182.0
Sandersville	29.3	29.3	152.7
Davilsboro	13.2	42.5	139.5
Louisville	13.0	55.5	126.5
Waynesboro	24.7	80.2	101.8
Perkin	13.8	94.0	88.0
Milten	7.5	101.5	80.5
Scarboro	7.7	109.2	72.8
Rockyford	4.7	113.9	68.1
Statorbo	16.7	130.6	51.4
Pretoria	4.5	135.1	46.9
Stilson	12.5	147.6	34.4
Blitchton	12.0	159.6	22.4
Eden	3.5	163.1	18.9
Pooler	9.2	172.3	9.7

	Milesto	Total Miles	Out Return
Tuscumbia	0.0	0.0	159.4
Barton	11.7	11.7	147.7
Cherokee	4.7	16.4	143.0
Iuka, Miss.	18.3	34.7	124.7
Burnsville	9.6	44.3	115.1
Corinth	15.5	59.8	99.6
Essary Springs, Tenn.	20.5	80.3	79.1
Rogers Spring	12.8	93.1	66.3

ITINERARIES COVERING THE MIDDLE WEST.

Buffalo to Chicago and Return by Way of Detroit and Canadian Points--Detroit to Cincinnati, Indianapolis and South Bend--Chicago-Indianapolis-St. Louis.

WHILE the Middle West does not perhaps offer the scenic grandeurs of New England and the East or the Pacific Coast and the Far West, there is abundant reason for outlining the itineraries presented herewith, aside from the desire to present additional routings which may be utilized in making transcontinental tours. An effort has been made to include in these itineraries a section of the country which not only will appeal to those who are making through tours, but those who are searching

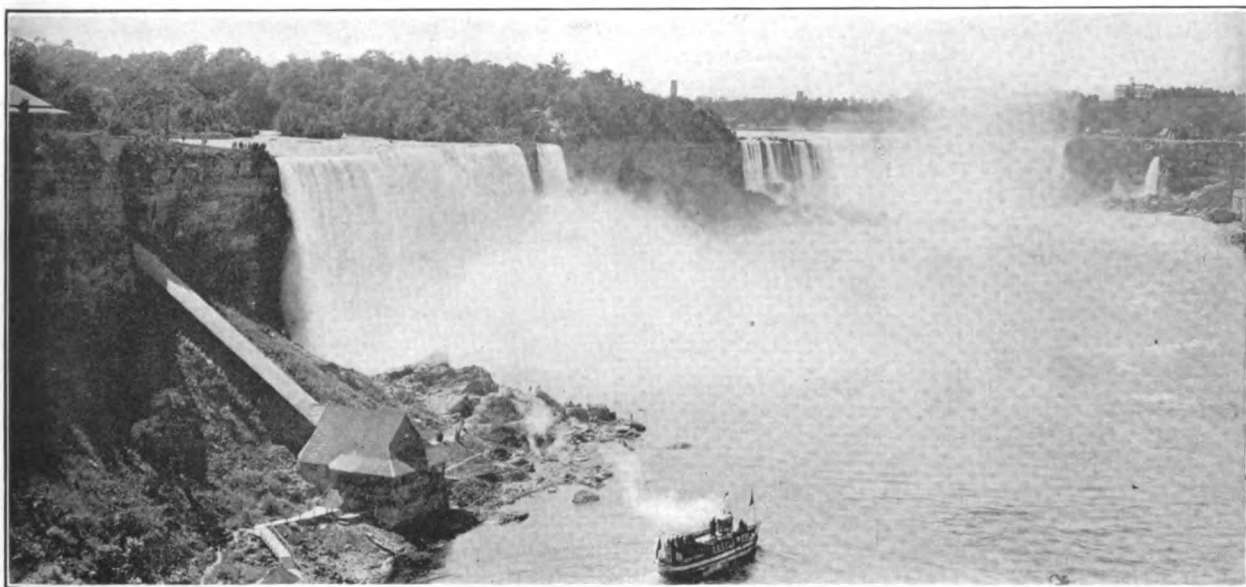
amount of damage to some of the roads over which this tour passes, it is understood that most of these have been placed in first-class condition. The route between Cincinnati and Indianapolis may be utilized as a portion of the transcontinental journey if desired.

Itinerary No. 153 offers the transcontinental tourist two options. Going from east to west, Indianapolis may be reached by way of Pittsburg and Cincinnati, utilizing other itineraries mentioned herein. The connection be-

Ont. Nine Days, 1189 Miles.

Buffalo-Ashtabula, 134.6 Miles.

	Miles to	Total Miles	
		Out	Return
Buffalo	0.0	0.0	134.6
Evans	21.2	21.2	113.4
Irving	7.6	28.8	105.8
Silver Creek	3.4	32.2	102.4
Sheridan	5.9	38.1	96.5
Fredonia	6.0	44.1	90.5
Brocton	6.8	50.9	83.7
Portland	1.4	52.3	82.3
Westfield	6.9	59.2	75.4
Forsythe	5.3	64.5	70.1
Ripley	3.8	68.3	66.3
State Line	3.0	71.3	63.3



Panoramic View of the American and Horseshoe Falls at Niagara, as Seen from the Upper Arch Bridge.

for good roads and plenty to divert the attention.

Itinerary No. 151 is outlined to connect Buffalo with Chicago over the so-called main transcontinental route. The return offers an option, with opportunity to visit some of the interesting centres of the industry, including Detroit, and a decidedly picturesque portion of Canada. The roads, both going and returning, are of such character as to leave no room for criticism.

Itinerary No. 152 connects Detroit with the South, and while the disastrous floods of the early spring of 1913 did an immense

tween Indianapolis and St. Louis is that utilized by the Indiana Manufacturers' Association in 1913. Those who desire may follow main transcontinental route to Chicago and then go to St. Louis by reversing the latter portion of this itinerary.

ITINERARY NO. 151.

Night Stops--Buffalo, N. Y.; Ashtabula and Toledo, O.; South Bend, Ind.; Chicago, Ill.; St. Joseph, Battle Creek and Detroit, Mich.; London,

Northeast, Penn.	4.4	75.7	58.9
Harbor Creek...	7.2	82.9	51.7
Wesleyville	3.8	86.7	47.9
Erie	3.3	90.0	44.6
Fairview	12.4	102.4	32.2
Girard	3.8	106.2	28.4
East Springfield.	5.5	111.7	22.9
West Springfield	3.8	115.5	19.1
Conneaut, O.....	4.6	120.1	14.5
Amboy	3.4	123.5	11.1
Kingsville	4.6	128.1	6.5
Ashtabula	6.5	134.6	0.0

Ashtabula-Toledo, 178.3 Miles.

	Miles to	Total Miles	
		Out	Return
Ashtabula	0.0	0.0	178.3
Saybrook	5.6	5.6	172.7
Geneva	4.2	9.8	168.5
Unionville	4.3	14.1	164.2
Madison	2.5	16.6	161.7
Palmerville	11.1	27.7	150.0
Mentor	5.8	33.5	144.8



State Line Hill on the Way from Buffalo, N. Y., to Erie, Penn.

Willoughby	4.9	38.4	139.9
Wickliffe	5.8	44.2	134.1
Euclid	2.8	47.0	131.3
Cleveland	10.3	57.3	121.0
Rocky River	8.0	65.3	113.0
Finney's Corners	1.8	67.1	111.2
Dover	4.4	71.5	106.8
Bement	3.4	74.9	103.4
Ridgeville	3.7	78.6	99.7
Elyria	4.7	83.3	95.0
Amherst	7.4	90.7	87.6
Henrietta	3.3	94.0	84.3
Birmingham	2.7	96.7	81.6
Berlinville	8.8	105.5	72.8
Norwalk	7.0	112.5	65.8
Monroeville	4.8	117.3	61.0
N. Monroeville	3.8	121.1	57.2
Bellevue	6.0	127.1	51.3
Clyde	7.6	134.7	43.6
Sandusky Jet	6.9	141.6	36.7
Fremont	0.7	142.3	36.0
Woodville	14.6	156.9	21.4
Lemoyne	6.5	163.4	14.9
Stony Bridge	2.0	165.4	12.9
Toledo	12.9	178.3	0.0

Toledo-South Bend, 166 Miles.

	Miles to	Total Miles	Out Return
Toledo	0.0	0.0	166.0
Java	17.0	17.0	149.0
Swanton	6.5	23.5	142.5
Delta	6.8	30.3	135.7
Wauseon	8.6	38.9	127.1
Archbold	10.3	49.2	116.8
Stryker	7.1	56.3	109.7
Bryan	8.1	64.4	101.6
Edgerton	11.6	76.0	90.0
Butler, Ind.	7.0	83.0	83.0
Waterloo	7.7	90.7	75.3
Kendallville	13.5	104.2	61.8
Brimfield	7.0	111.2	54.8
Wawaka	4.5	115.7	50.3
Ligonier	6.2	121.9	44.1
Millersburg	9.2	131.1	34.9
Goshen	9.4	140.5	25.5
Elkhart	10.2	150.7	15.3
Osceola	6.0	156.7	9.3
Mishawaka	5.3	162.0	4.0
South Bend	4.0	166.0	0.0

South Bend-Chicago, 101.1 Miles.

	Miles to	Total Miles	Out Return
South Bend	0.0	0.0	101.1

	Miles to	Total Miles	Out Return
Chicago	0.0	0.0	122.8
Washington Park	6.2	6.2	116.6
Burnside	5.2	11.4	111.4
Roseland	3.1	14.5	108.3
Kensington	0.7	15.2	107.6
Riverdale	2.6	17.8	105.0
Dolton	0.7	18.5	104.3
Oak Glen	6.3	24.8	98.0
Lansing	1.4	26.2	96.6
Munster	0.7	26.9	95.9
Highlands, Ind.	3.1	30.0	92.8
Gary	7.4	37.4	85.4
Hobart	4.0	41.4	81.4
Porter	13.1	54.5	68.3
Michigan City	16.2	70.7	52.1
Rolling Prairie	14.8	85.5	37.3
Hudson Lake	5.0	90.5	32.3
Gallen, Mich.	7.8	98.3	24.5
Glendora	5.9	104.2	18.6
Hill's Corners	6.0	110.2	12.6
Baroda	1.0	111.2	11.6
Stevensville	4.4	115.6	7.2
St. Joseph	7.2	122.8	0.0
St. Joseph-Battle Creek, 75 Miles.			

	Miles to	Total Miles	Out Return
St. Joseph	0.0	0.0	75.0
Benton Harbor	1.4	1.4	73.6
Riverside	6.1	7.5	67.5
Coloma	4.2	11.7	63.3
Watervliet	2.3	14.0	61.0
Hartford	4.8	18.8	56.2
Lawrence	5.8	24.6	50.4
Paw Paw	8.8	33.4	41.6
Almena	5.6	39.0	36.0
Kalamazoo	12.6	51.6	23.4
Galesburg	8.6	60.2	14.8
Gull Lake Junction	5.3	65.5	9.5
Battle Creek	9.5	75.0	0.0
Battle Creek-Detroit, 116.5 Miles.			

	Miles to	Total Miles	Out Return
Battle Creek	0.0	0.0	116.5
Cresco	8.0	8.0	108.5
Marshall	5.1	13.1	103.4
Albion	11.3	24.4	92.1
Parma	7.9	32.3	84.2



One of the Many Pennsylvania Toll Gates at Charmion.

ITINERARY NO. 152.

Night Stops—Detroit, Mich.;
Lima and Cincinnati, O.; In-
dianapolis and South Bend,
Ind. Five Days, 718.6 Miles.

Detroit-Lima, 138.2 Miles.

	Miles to	Total Miles	Out	Return
Detroit	0.0	0.0	138.2	
Ecorse	8.9	8.9	129.3	
Wyandotte	2.8	11.7	126.5	
Trenton	4.3	16.0	122.2	
Old Port	12.5	28.5	109.7	
Monroe	9.2	37.7	100.5	
La Salle	4.5	42.2	96.0	
Erle	5.5	47.7	90.5	
Toledo, O.	10.7	58.4	79.8	
Maumee	9.0	67.4	70.8	
Perrysburg	1.5	68.9	69.3	
Bowling Green	12.6	81.5	56.7	
Portage	3.3	84.8	53.4	
Van Buren	12.7	97.5	40.7	
Mortimer	2.0	99.5	38.7	
Findlay	5.9	105.4	32.8	
Mt. Cory	11.8	117.2	21.0	
Bluffton	5.8	123.0	15.2	
Beaver Dam	6.3	129.3	8.9	
Lima	8.9	138.2	0.0	

Lima-Cincinnati, 130.1 Miles.

	Miles to	Total Miles	Out	Return
Lima	0.0	0.0	130.1	
Snyder	5.4	5.4	124.7	
Cridersville	2.3	7.7	122.4	
Wapakoneta	7.9	15.6	114.5	
Botkins	7.2	22.8	107.3	
Anna	5.0	27.8	102.3	
Sidney	7.7	35.5	94.6	
Piqua	12.7	48.2	81.9	
Troy	8.5	56.7	73.4	
Eaglesburg	8.1	64.8	65.3	
Vandalia	2.4	67.3	62.9	
Chambersburg	2.3	69.5	60.6	
Dayton	7.7	77.2	52.9	
Centerville	9.3	86.5	43.6	
Ridgeville	6.9	93.4	36.7	



Pleasant View on the Way to Lake Rosseau in Western Ontario.

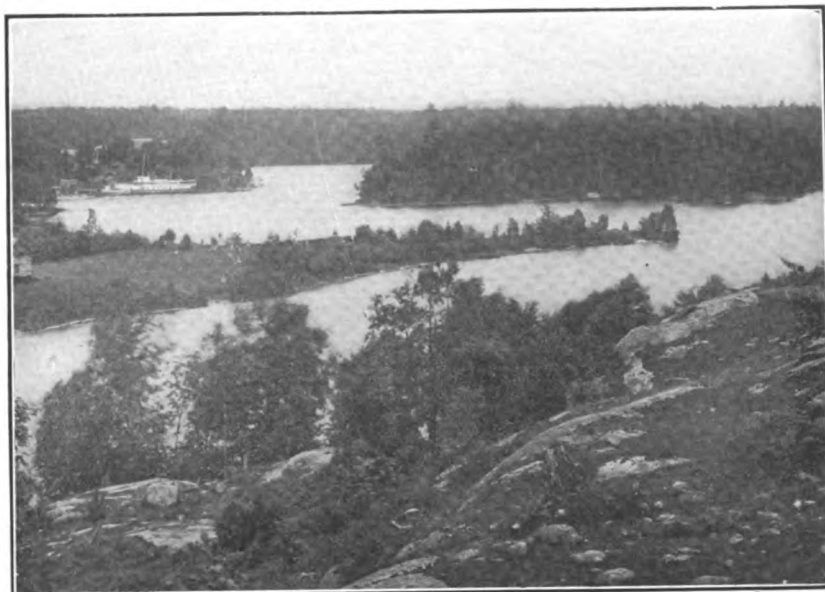
Jackson	10.3	42.6	73.9	Winona	5.6	91.9	60.8
Grass Lake	10.1	52.7	63.8	Grimsbey	5.1	97.0	55.7
Chelsea	11.3	64.0	52.5	Beamsville	4.9	101.9	50.8
Lima Center	8.6	72.6	43.9	Vineland	4.2	106.1	46.6
Ann Arbor	10.1	82.7	33.8	Jordan	1.8	107.9	44.8
Ypsilanti	8.4	91.1	25.4	St. Catharines	7.1	115.0	37.7
Wayne	12.2	103.3	13.2	Homer	3.3	118.3	34.4
Dearborn	7.2	110.5	6.0	St. Davids	4.9	123.2	29.5
Detroit	6.0	116.5	0.0	Stamford	2.1	125.3	27.4

Detroit-London, 142 Miles.

	Miles to	Total Miles	Out	Return
Detroit	0.0	0.0	142.0	
Windsor, Ont.	0.4	0.4	141.6	
Old Castle	8.9	9.3	132.7	
Maldstone	3.5	12.8	129.2	
Essex	4.5	17.3	124.7	
Olinda	5.3	22.6	119.4	
Ruthven	7.8	30.4	111.6	
Leamington	3.6	34.0	108.0	
Wheatley	7.8	41.8	100.2	
Cedar Springs	26.7	68.5	73.5	
Blenheim	4.1	72.6	69.4	
Ridgetown	9.9	82.5	59.5	
Highgate	6.4	88.9	53.1	
Clachan	7.7	96.6	45.4	
Wardaville	7.5	104.1	37.9	
Wood Green	3.1	107.2	34.8	
Strathburn	3.0	110.2	31.8	
Melbourne	9.3	119.5	22.5	
Delaware	9.4	128.9	13.1	
Lambeth	6.6	135.5	6.5	
London	6.5	142.0	0.0	

London-Buffalo, 152.7 Miles.

	Miles to	Total Miles	Out	Return
London	0.0	0.0	152.7	
Crumlin	5.8	5.8	146.9	
Thamesford	8.3	14.1	138.6	
Ingersoll	6.3	20.4	132.3	
Beachville	4.7	25.1	127.6	
Woodstock	4.7	29.8	122.9	
Oxford	4.5	34.3	118.4	
Cathcart	8.1	42.4	110.3	
Brantford	13.9	56.3	96.4	
Gainsville	3.3	59.6	93.1	
Ancaster	13.2	72.8	79.9	
Hamilton	6.8	79.6	73.1	
Stony Creek	6.7	86.3	66.4	



Lake Joseph at Port Cockburn Presents Much Beautiful Island Scenery.

Lebanon	6.9	100.3	29.8
Hageman	4.5	104.8	25.3
Mason	3.8	108.6	21.5
Pisgah	4.2	112.8	17.3
Sharon	4.0	116.8	13.3
Reading	3.7	120.5	9.6
Cincinnati	9.6	130.1	0.0

Cincinnati-Indianapolis, 124 Miles.

Logansport	13.0	70.1	65.9
Meta	8.7	78.8	57.2
Rochester	13.9	92.7	43.3
Argos	14.5	107.2	28.8
Plymouth	5.1	112.3	23.7
Lapas	8.2	120.5	15.5
Lakeville	4.9	125.4	10.6
South Bend	10.6	136.0	0.0

South Bend-Detroit, 190.3 Miles.

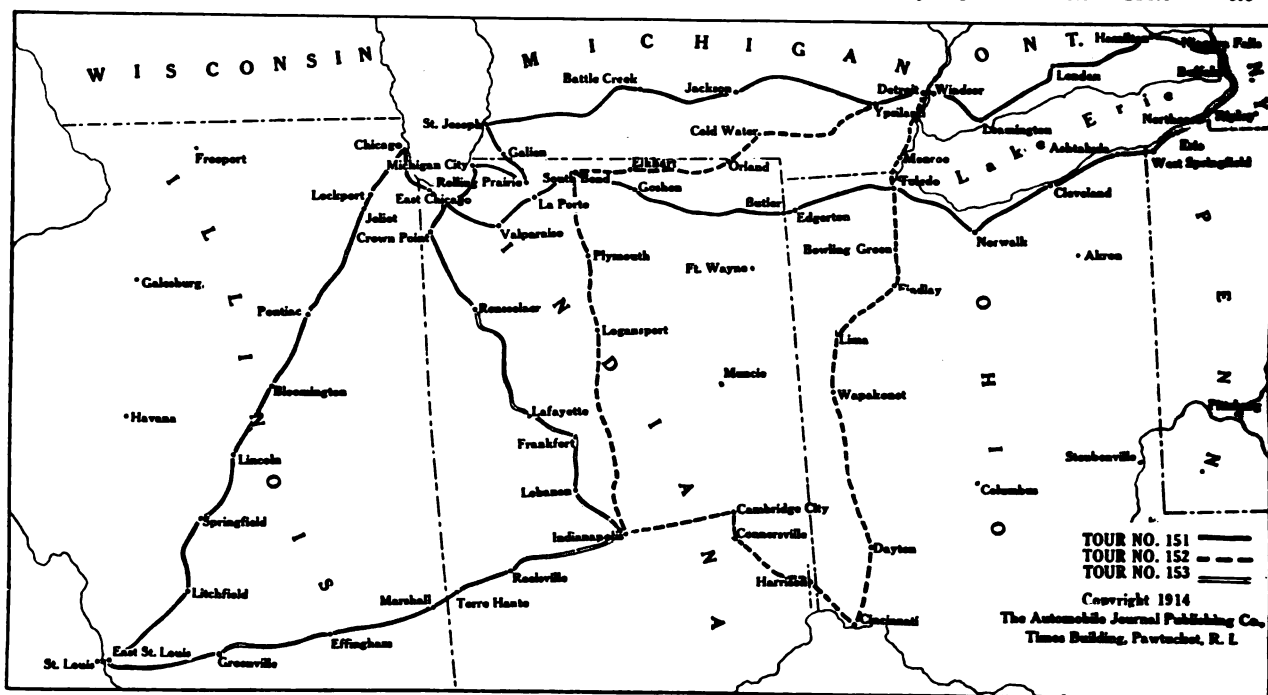
Mo.; Springfield and Bloomington, Ill. Seven Days, 779.4 Miles.

Chicago-Lafayette, 136.1 Miles.

	Miles to	Total Miles	Out Return
Cincinnati	0.0	0.0	124.0
Cheviot	7.8	7.8	116.2
Dent	2.5	10.3	113.7
Miami	3.8	14.1	109.9
Harrison	7.9	22.0	102.0
New Trenton, Ind.	6.1	28.1	95.9
Cedar Grove	5.1	33.2	90.8
Brookville	6.6	39.8	84.2
Everton	11.6	51.4	72.6
Connersville	6.7	58.1	65.9
Milton	10.3	68.4	55.6
Cambridge City	2.2	70.6	53.4

	Miles to	Total Miles	Out Return
South Bend	0.0	0.0	190.3
Minawaka	4.0	4.0	186.3
Osceola	5.3	9.3	181.0
Elkhart	10.2	19.5	170.8
Middlebury	13.5	33.0	157.3
Shipshewana	6.3	39.3	151.0
Howe	12.6	51.9	138.4
Breton	5.7	57.6	132.7
Orland	7.3	64.9	125.4
Kinderhook, Mich.	14.0	78.9	111.4
Cold Water	9.6	88.5	101.8

	Miles to	Total Miles	Out Return
Chicago	0.0	0.0	136.1
Highlands, Ind.	30.0	30.0	106.1
Schererville	4.6	34.6	101.5
Crown Point	9.2	43.8	92.3
Thayer	17.7	61.5	74.6
Roselawn	3.0	64.5	71.6
Aix	15.5	80.0	56.1
Rensselaer	7.4	87.4	48.7
Remington	11.9	99.3	36.8
Wolcott	6.3	105.6	30.5
Montmorenci	20.0	125.6	10.5
Lafayette	10.5	136.1	0.0



Dublin	1.9	72.5	51.5
Strawn	4.6	77.1	46.9
Lewisville	3.3	80.4	43.6
Dunreith	4.5	84.9	39.1
Ogden	1.8	86.7	37.3
Raysville	2.3	89.0	35.0
Knightstown	0.8	89.8	34.2
Charlottesville	4.6	94.4	29.6
Cleveland	2.0	96.4	27.6
Greenfield	6.5	102.9	21.1
Cumberland	10.0	112.9	11.1
Indianapolis	11.1	124.0	0.0

Indianapolis-South Bend, 136 Miles.

	Miles to	Total Miles	Out Return
Indianapolis	0.0	0.0	136.0
Augusta	9.7	9.7	126.3
Rosaton	11.3	21.0	115.0
Kirklin	10.4	31.4	104.6
Boyleston	6.8	38.2	97.8
Middlefork	8.6	46.8	89.2
Burlington	4.5	51.3	84.7
Darwin	2.6	53.9	82.1
Carroll	3.2	57.1	78.9

Quincy	6.2	94.7	95.6
Allen	5.9	100.6	89.7
Jonesville	5.6	106.2	84.1
Milne's Corners	4.1	110.3	80.0
Moscow	5.0	115.3	75.0
Somerset Center	4.9	120.2	70.1
Somerset	1.9	122.1	68.2
Cambridge Junction	8.0	130.1	60.2
Clinton	13.1	143.2	47.1
Saline	11.9	155.1	35.2
Ypsilanti	9.8	164.9	25.4
Wayne	12.2	177.1	13.2
Dearborn	7.2	184.3	6.0
Detroit	6.0	190.3	0.0

ITINERARY NO. 153.

Night Stops—Chicago, Ill.; Lafayette, Indianapolis and Terre Haute, Ind.; St. Louis,

Lafayette-Indianapolis, 66 Miles.

	Miles to	Total Miles	Out Return
Lafayette	0.0	0.0	66.0
Dayton	7.5	7.5	58.5
Mulberry	3.8	11.3	54.7
Frankfort	12.7	24.0	42.0
Antioch	3.5	27.5	38.5
Mechanicsburg	5.1	32.6	33.4
Pike	2.3	34.9	31.1
Lebanon	5.4	40.3	25.7
Royalton	10.8	51.1	14.9
Bootjack	4.9	56.0	10.0
Flacksville	5.5	61.5	4.5
Indianapolis	4.5	66.0	0.0

Indianapolis-Terre Haute, 70.5 Miles.

	Miles to	Total Miles	Out Return
Indianapolis	0.0	0.0	70.5
Bridgeport	9.0	9.0	61.5
Plainfield	4.8	13.8	56.7

Belleville	4.9	18.7	51.8
Stilesville	8.1	26.8	43.7
Mt. Meridian	7.0	33.8	36.7
Coatsville	6.1	39.9	30.6
Manhattan	3.5	43.4	27.1
Reelsville	2.4	45.8	24.7
Harmony	5.9	51.7	18.8
Brasil	3.1	54.8	15.7
Seeleyville	7.6	62.4	8.1
Terre Haute	8.1	70.5	0.0
Terre Haute-St. Louis, 173 Miles.			

	Miles to	Total Miles	Out Return
Terre Haute	0.0	0.0	173.0
Conn, Ill.	13.8	13.8	159.2
Marshall	3.0	16.8	156.2
Clarke	5.0	21.8	151.2
Martinsville	5.8	27.6	145.4
Oakleaf	4.1	31.7	141.3
Casey	2.2	33.9	139.1
Greenup	9.8	43.7	129.3
Jewett	5.2	48.9	124.1
Woodbury	3.1	52.0	121.0
Montrose	4.7	56.7	116.3
Teutopolis	5.3	62.0	111.0
Effingham	3.9	65.9	107.1
Dexter	10.1	76.0	97.0
Altamont	4.3	80.3	92.7
Brownstown	11.7	92.0	81.0

Bluff City	5.9	97.9	75.1
Vandalia	2.3	100.2	72.8
Hagerstown	4.3	104.5	68.5
Mulberry	6.7	111.2	61.8
Greenville	8.7	119.9	53.1
Stubblefield	4.9	124.8	48.2
Pocahontas	4.7	129.5	43.5
Highland	10.3	139.8	33.2
St. Jacobs	6.2	146.0	27.0
Troy	6.8	152.8	20.2
Collinsville	7.3	160.1	12.9
East St. Louis	10.8	170.9	2.1
St. Louis, Mo.	2.1	173.0	0.0
St. Louis-Springfield, 107.8 Miles.			

	Miles to	Total Miles	Out Return
St. Louis	0.0	0.0	107.8
E. St. Louis, Ill.	2.1	2.1	105.7
Collinsville	10.8	12.9	94.9
Troy	3.0	15.9	91.9
Marysville	1.2	17.1	90.7
Edwardsville	8.3	25.4	82.4
Hamel	8.2	33.6	74.2
Staunton	11.0	44.6	63.2
Mt. Olive	6.4	51.0	56.8
Litchfield	10.9	61.9	45.9
Glenarm	31.6	93.5	14.3
Cotton Hill	6.2	99.7	8.1
Springfield	8.1	107.8	0.0

Springfield-Bloomington, 76.5 Miles.

	Miles to	Total Miles	Out Return
Springfield	0.0	0.0	76.5
Williamsville	15.0	15.0	61.5
Elkhart	8.0	23.0	53.5
Lincoln	14.5	37.5	39.0
McLean	20.9	58.4	18.1
Shirley	11.2	69.6	6.9
Bloomington	6.9	76.5	0.0

Bloomington-Chicago, 149.5 Miles.

	Miles to	Total Miles	Out Return
Bloomington	0.0	0.0	149.5
Towanda	8.2	8.2	141.3
Lexington	10.1	18.3	131.2
Pontiac	22.9	41.2	108.3
Odell	10.8	52.0	97.5
Dwight	8.1	60.1	89.4
Morris	19.3	79.4	70.1
Minooka	13.3	92.7	56.8
Joliet	13.9	106.6	42.9
Lockport	4.0	110.6	38.9
LaGrange	19.5	130.1	19.4
Forest Park	9.5	139.6	9.9
Chicago	9.9	149.5	0.0

THE FAR WEST AND THE PACIFIC COAST.

Suggestions for Transcontinental Touring, Reaching the Great Northwest, Traversing the Coast Line, the Rocky Mountain Districts and Canadian Points.

WITH the interest in good roads which has been manifested by the people of the Far West and Pacific Coast regions during the past few years, and the steady improvement in the construction of the automobile, it is not entirely true to state that any road in the United States is impracticable. However, it goes without saying that some roads are much better than others, even in the mountainous districts and desert portions of these sections.

It is anticipated that many eastern motorists will plan transcontinental tours in visiting the Panama-Pacific exposition in 1915. For this reason, The Automobile Journal has sought to offer additional information of this character in this Eighth Annual Touring Number.

Itinerary No. 201 may be used in combination with other tours previously outlined, as an alternative for the Lincoln highway. The roads from St. Louis to Salt Lake City have been almost entirely rebuilt during the past two or three years, and the way from Salt Lake City to Reno is over the better known transcontinental route, which has now been supplanted by the Lincoln

highway. Much road work also has been done on the so-called southern transcontinental route, listed as itinerary No. 202, from Memphis to Los Angeles.

Itinerary No. 203 is offered for those who have been requesting detailed information concerning a northwestern tour leading from Chicago to Seattle. The Automobile Journal's routing car found this very bad in places, particularly in western Montana, across Idaho and in eastern Washington. This applies, of course, to the mountain ways, since the roads in the vicinity of the cities visited have been improved. It may be suggested that a much better route is to be found by using itinerary No. 208, connecting with either the Lincoln highway or the Pikes Peak transcontinental route at Salt Lake City. However, modern automobiles can negotiate any route listed herein.

The Winnipeg-Galveston route, listed as itinerary No. 206, will be found to have received very careful attention on the part of road workers, and throughout most of the distance good roads will be encountered. This year, as well, Vancouver, B. C., is included in the listings, and it is under-

stood that much road work has been done over this section. The other routes included herein are somewhat well known to transcontinental tourists.

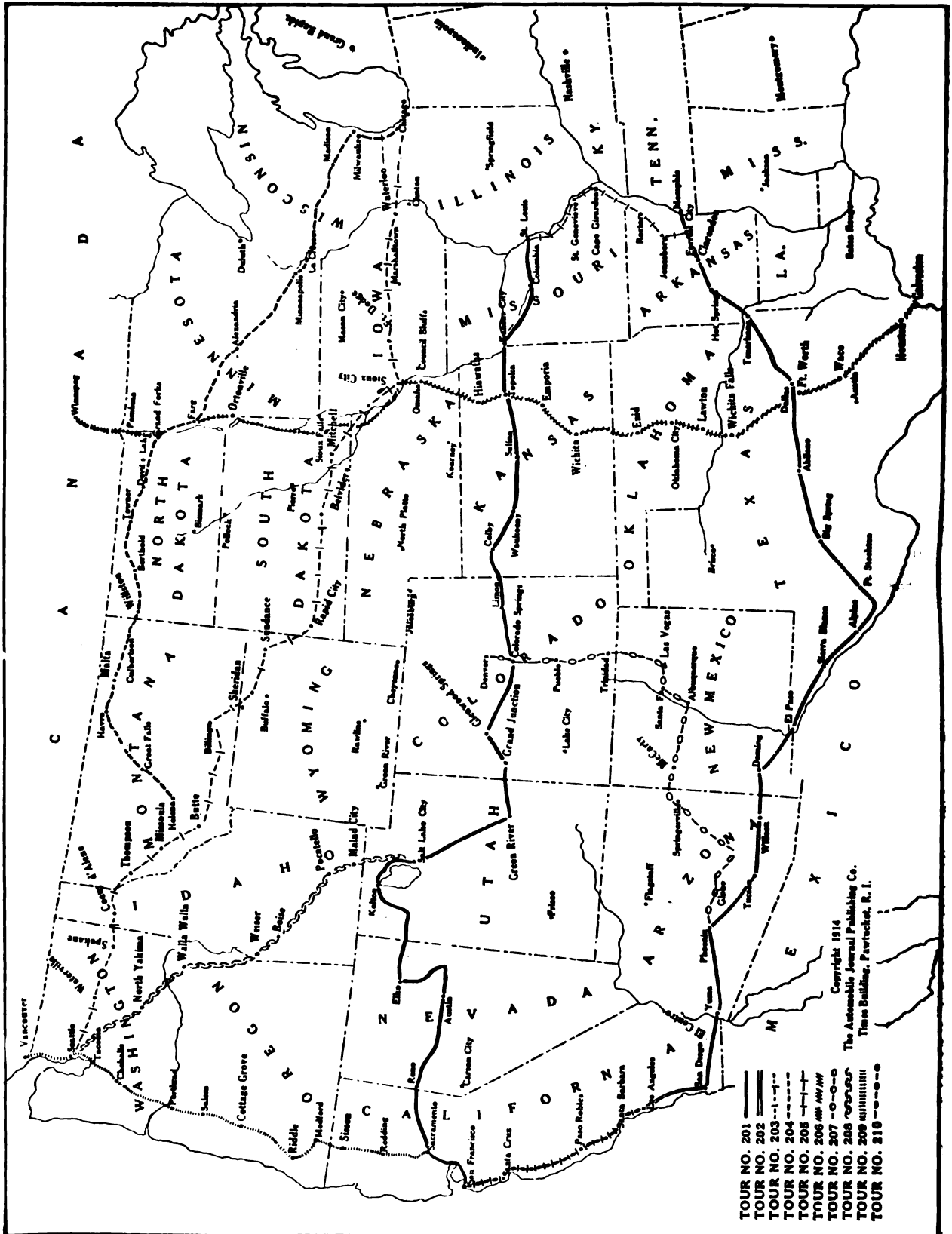
ITINERARY NO. 201.

St. Louis to San Francisco.

Night Stops—St. Louis, Columbia and Kansas City, Mo.; Topeka, Salina, Waukeeneey and Colby, Kan.; Limon, Colorado Springs, Leadville, Glenwood Springs and Grand Junction, Col.; Green River, Castlegate, Salt Lake City and Kelton, Utah; Elko, Austin and Reno, Nev.; Sacramento and San Francisco, Cal. Twenty Days, 2604.2 Miles.

St. Louis-Columbia, 140.5 Miles.

	Miles to	Total Miles	Out Return
St. Louis	0.0	0.0	140.5
Wellston	6.5	6.5	134.0
Pattonville	7.7	14.2	126.3



St. Charles	5.8	20.0	120.5
Harvester	6.6	26.6	113.9
Colterville	4.2	30.8	109.7
Dardenne	6.2	37.0	103.5
Wentzville	8.0	45.0	95.5
Foristell	7.0	52.0	88.5
Wright City	4.5	56.5	84.0
Truesdale	8.5	65.0	75.5
Warrenton	1.0	66.0	74.5
Jonesburg	9.7	75.7	64.8
High Hill	4.2	79.9	60.6
Danville	8.7	88.6	51.9
Mincola	2.6	91.2	49.3
Williamsburg	8.3	99.5	41.0
Calwood	9.4	108.9	31.6
Fulton	8.0	116.9	23.6
Millersburg	11.0	127.9	12.6
Columbia	12.6	140.5	0.0

Columbia-Kansas City, 159 Miles.

	Miles to	Total Miles
	Out Return	
Columbia	0.0	0.0 159.0
Midway	8.0	8.0 151.0
Rockport	6.3	14.3 144.7
New Franklin	15.7	30.0 129.0
Booneville	3.0	33.0 126.0
Lamine	8.7	41.7 117.3
Arrow Rock	11.7	53.4 105.6
Marshall	17.0	70.4 88.6
Malta Bend	12.2	82.6 76.4
Waverly	9.5	92.1 66.9
Dover	11.2	103.3 55.7
Lexington	11.0	114.3 44.7
Myrick	1.5	115.8 43.2
Wellington	5.8	121.6 37.4
Levasy	10.5	132.1 26.9
Buckner	3.6	135.7 23.3
Blue Town	8.2	143.9 15.1
Independence	6.1	150.0 9.0
Centropolis	4.2	154.2 4.8
Kansas City	4.8	159.0 0.0

Kansas City-Topeka, 78.5 Miles.

	Miles to	Total Miles
	Out Return	
Kansas City	0.0	0.0 78.5
Muncie	10.0	10.0 68.5
Bonner Springs	8.0	18.0 60.5
Lenape	6.8	24.8 53.7
De Soto	2.3	27.1 51.4
Eudora	9.5	36.6 41.9
Lawrence	8.2	44.8 33.7
Midland	3.0	47.8 30.7
Buck Creek	5.5	53.3 25.2
Perry	7.2	60.5 18.0
Grantville	10.5	71.0 7.5
Topeka	7.5	78.5 0.0

Topeka-Salina, 132.3 Miles.

	Miles to	Total Miles
	Out Return	
Topeka	0.0	0.0 132.3
Silver Lake	13.8	13.8 118.5
Kingsville	2.6	16.4 115.9
Rossville	3.1	19.5 112.8
St. Marys	7.4	26.9 105.4
Belvue	7.2	34.1 98.2
Wamego	7.8	41.9 90.4
St. George	5.7	47.6 84.7
Manhattan	12.7	60.3 72.0
Ogden	12.2	72.5 59.8
Fort Riley	5.5	78.0 54.3
Junction City	4.0	82.0 50.3
Chapman	15.0	97.0 35.3
Detroit	4.0	101.0 31.3
Abilene	6.3	107.3 25.0
Solomon	9.0	116.3 16.0
Salina	16.0	132.3 0.0

Salina-Waukeaney, 143 Miles.

	Miles to	Total Miles
	Out Return	
Salina	0.0	0.0 143.0
Bavaria	8.5	8.5 134.5

Brookville	6.5	15.0 128.0
Carneiro	10.0	25.0 118.0
Kanopolis	8.5	33.5 109.5
Ellsworth	10.5	44.0 99.0
Wilson	14.0	58.0 85.0
Dorrance	7.5	65.5 77.5
Bunker Hill	7.5	73.0 70.0
Russell	9.5	82.5 60.5
Gorham	8.7	91.2 51.8
Walker	3.0	94.2 48.8
Victoria	4.0	98.2 44.8
Hays	10.5	108.7 34.3
Ellis	15.0	123.7 19.3
Ogallah	10.5	134.2 8.8
Waukeaney	8.8	143.0 0.0

Waukeaney-Colby, 82.5 Miles.

	Miles to	Total Miles
	Out Return	
Waukeaney	0.0	0.0 82.5
Voda	6.5	6.5 76.0

Stratton	9.3	85.6 63.4
Vona	9.0	94.6 54.4
Stebert	6.7	101.3 47.7
Flagler	11.3	112.6 36.4
Arriba	11.9	124.5 24.5
Bovena	6.0	130.5 18.5
Genoa	5.8	136.3 12.7
Limon	12.7	149.0 0.0

Limon-Colorado Springs, 84.5 Miles.

	Miles to	Total Miles
	Out Return	
Limon	0.0	0.0 84.5
Resolia	8.5	8.5 76.0
Mattison	10.3	18.8 65.7
Simla	6.4	25.2 59.3
Rama	6.3	31.5 53.0
Calhan	9.5	41.0 43.5
Reynon	11.0	52.0 32.5



On the Road to Emerald Lake—Photo by Canadian Pacific.

Collyer	5.4	11.9 70.6
Quinter	7.6	19.5 63.0
Buffalo Park	8.6	28.1 54.4
Grainfield	5.6	33.7 48.8
Grinnell	9.0	42.7 39.8
Campus	5.8	48.5 34.0
Oakley	6.5	55.0 27.5
Mingo	15.5	70.5 12.0
Colby	12.0	82.5 0.0

Colby-Limon, 149 Miles.

	Miles to	Total Miles
	Out Return	
Colby	0.0	0.0 149.0
Levant	8.8	8.8 140.2
Brewster	10.2	19.0 130.0
Goodland	18.0	37.0 112.0
Buelton	9.8	46.8 102.2
Kanorado	8.0	54.8 94.2
Burlington, Col.	13.0	67.8 81.2
Muskoka	8.5	76.3 72.7

Colorado Springs-Leadville, 140.8 Miles.

	Miles to	Total Miles
	Out Return	
Colorado Springs	0.0	0.0 140.8
Colorado City	2.3	2.3 138.5
Manitou	3.4	5.7 135.1
Cascade	4.3	10.0 130.8
Green Mountain		
Falls	3.7	13.7 127.1
Crystola	2.0	15.7 125.1
Edlowe	5.0	20.7 120.1
Divide	3.4	24.1 116.7
Florissant	8.8	32.9 107.9
Lake George	5.2	38.1 102.7
Lidderdale	2.0	40.1 100.7

Springer	4.2	44.3	96.5
Idlewild	3.0	47.3	93.5
Howber	3.0	50.3	90.5
Spinney	5.2	55.5	85.3
Hartsel	11.0	66.5	74.3
Haver	9.0	75.5	65.3
Bath	8.5	84.0	56.8
Newell	6.3	90.3	50.5
Buena Vista	10.0	100.3	40.5
Wild Horse	3.5	103.8	37.0
Americus	3.5	107.3	33.5
Barre	3.5	110.8	30.0
Waco	10.0	120.8	20.0
Snowden	11.0	131.8	9.0
Leadville	9.0	140.8	0.0

**Leadville-Glenwood Springs,
88.5 Miles.**

	Miles to	Total Miles	
	Out	Return	
Leadville	0.0	0.0	88.5
Keeldar	5.8	5.8	82.7
Climax	4.1	9.9	78.6
Mitchell	2.8	12.7	75.8
Pando	5.0	17.7	70.8
Redcliff	5.0	22.7	65.8
Belden	2.9	25.6	62.9
Minturri	4.3	29.9	58.6

Morris	4.2	41.4	62.2
Pullson	3.0	44.4	59.2
Grand Valley	9.2	53.6	50.0
Una	5.0	58.6	45.0
Nigger Hill	4.0	62.6	41.0
De Beque	3.5	66.1	37.5
Akin	6.8	72.9	30.7
Tunnel	4.2	77.1	26.5
Gale	5.0	82.1	21.5
Cameo	2.5	84.6	19.0
Palisades	5.0	89.6	14.0
Clifton	7.0	96.6	7.0
Grand Junction	7.0	103.6	0.0

**Grand Junction-Green River,
114.9 Miles.**

	Miles to	Total Miles	
	Out	Return	
Grand Junction	0.0	0.0	114.9
Ute	6.8	6.8	108.1
Rhone	3.0	9.8	105.1
Fruita	3.5	13.3	101.6
Loma	5.0	18.3	96.6
Crevasse	2.5	20.8	94.1
Mack	2.8	23.6	91.3
Ruby	4.2	27.8	87.1
Shale	4.3	32.1	82.8
Utahline	6.2	38.3	76.6



Motor Tourists Leaving the Garden of the Gods, Colorado.

Avon	7.2	37.1	51.4
Edwards	3.0	40.1	48.4
Allenton	3.1	43.2	45.3
Wolcott	4.0	47.2	41.3
Sherwood	2.5	49.7	38.8
Ortega	3.0	52.7	35.8
Eagle	5.0	57.7	30.8
Gypsum	5.9	63.6	24.9
Dotsera	6.8	70.4	18.1
Shoshone	7.8	78.2	10.3
Grizzly	5.0	83.2	5.3
Glenwood Springs	5.3	88.5	0.0

**Glenwood Springs-Grand
Junction, 103.6 Miles.**

	Miles to	Total Miles	
	Out	Return	
Glenwood Springs	0.0	0.0	103.6
South Canon	3.8	3.8	99.8
Chacra	3.8	7.6	96.0
New Castle	7.9	15.5	88.1
Chapman	4.0	19.5	84.1
Silt	6.7	26.2	77.4
Antlers	3.2	29.4	74.2
Rifle	4.0	33.4	70.2
Lucy	3.8	37.2	66.4

**Green River-Castle gate, 90.6
Miles.**

	Miles to	Total Miles	
	Out	Return	
Green River	0.0	0.0	90.6
Sphinx	6.5	6.5	84.1
Desert	7.2	13.7	76.9
Woodside	12.5	26.2	64.4
Grassy	5.8	32.0	58.6
Whites	21.0	53.0	37.6
Wellington	18.5	71.5	19.1

Price	6.8	78.3	12.3
Helper	7.5	85.8	4.8
Castlegate	4.8	90.6	0.0

**Castlegate-Salt Lake City,
118.5 Miles.**

	Miles to	Total Miles	
	Out	Return	
Castlegate	0.0	0.0	118.5
Nolan	5.0	5.0	113.5
Kyune	4.5	9.5	109.0
Colton	4.8	14.3	104.2
Summit	7.5	21.8	96.7
Midway	3.5	25.3	93.2
Tucker	4.0	29.3	89.2
Mill Fork	7.0	36.3	82.2
Red Narrow	5.2	41.5	77.0
Rio	2.8	44.3	74.2
Thistle	4.5	48.8	69.7
Castillo	5.8	54.6	63.9
Spanish Fork	7.0	61.6	56.9
Springville	5.0	66.6	51.9
Provo	6.3	72.9	45.6
Lindon	8.7	81.6	36.9
Pleasant Grove	2.0	83.6	34.9
American Fork	3.3	86.9	31.6
Lehi	3.4	90.3	28.2
Mesa	2.8	93.1	25.4
Olivera	9.0	102.1	16.4
Sandy	4.8	106.9	11.6
Murray	4.7	111.6	6.9
Salt Lake City	6.9	118.5	0.0

**Salt Lake City-Kelton, 147.8
Miles.**

	Miles to	Total Miles	
	Out	Return	
Salt Lake City	0.0	0.0	147.8
Bountiful	9.1	9.1	138.7
Centerville	2.2	11.3	136.5
Farmington	7.7	19.0	128.8
Kaysville	2.1	21.1	126.7
Layton	2.5	23.6	124.2
Clearfield	4.7	28.3	119.5
Ogden	9.1	37.4	110.4
North Ogden	8.9	46.3	101.5
Willard	5.0	51.3	96.5
Brigham	9.4	60.7	87.1
Honeyville	9.3	70.0	77.8
Deweyville	4.3	74.3	73.5
Tremonton	6.3	80.6	67.2
Blue Springs	19.8	100.4	47.4
Snowville	18.5	118.9	28.9
Curlew	7.3	126.2	21.6
Kelton	21.6	147.8	0.0

Kelton-Elko, 182.8 Miles.

	Miles to	Total Miles	
	Out	Return	
Kelton	0.0	0.0	182.8
Terrace	23.9	23.9	158.9
Lucin	26.7	50.6	132.2
Tacoma, Nev.	12.3	62.9	119.9
Montella	13.2	76.1	106.7
Loray	12.3	88.4	94.4
Cobre	5.2	93.6	89.2
Fenlon	18.3	111.9	70.9
Wells	19.2	131.1	51.7
Deeth	21.6	152.7	30.1
Hallick	10.7	163.4	19.4
Elko	19.4	182.8	0.0

Elko-Austin, 175 Miles.

	Miles to	Total Miles	
	Out	Return	
Elko	0.0	0.0	175.0
Hylton & Hanna			
Stores	33.0	33.0	142.0
Sadler's Ranch	17.0	50.0	125.0
Eureka	55.0	105.0	70.0
Austin	70.0	175.0	0.0

Austin-Reno, 183.5 Miles.

	Miles to	Total Miles	
	Out	Return	
Austin	0.0	0.0	183.5
Alpine Ranch	47.5	47.5	136.0



Emerald Bay, an Arm of the Beautiful Lake Tahoe, California.

Eastgate	12.5	60.0	123.5
Westgate	20.0	80.0	103.5
Sand Springs.....	10.0	90.0	93.5
Fallon	27.0	117.0	66.5
Leetville	8.0	125.0	58.5
Hazen	8.5	133.5	50.0
Fernley	12.5	146.0	37.5
Wadsworth	3.5	149.1	34.0
Sparks	30.0	179.5	4.0
Reno	4.0	183.5	0.0

Reno-Sacramento, 152.7 Miles.

	Miles to	Total Miles	
		Out Return	
Reno	0.0	0.0	152.7
Lawton	6.5	6.5	146.2
Verdi	5.5	12.0	140.7
Truckee, Cal.....	23.0	35.0	117.7
Emigrant Gap.....	32.0	67.0	85.7
Alta	12.0	79.0	73.7
Gold Run	4.0	83.0	69.7
Magma	3.5	86.5	66.2
Colfax	7.5	94.0	58.7
Welmar	5.2	99.2	53.5
Clipper Gap.....	6.7	105.9	46.8
Auburn	6.0	111.9	40.8
Folsom	18.0	130.9	21.8
Sacramento	21.8	152.7	0.0

Sacramento-San Francisco,
136.2 Miles.

	Miles to	Total Miles	
		Out Return	
Sacramento	0.0	0.0	136.2
Elk Grove	14.8	14.8	121.4
McConnell	3.1	17.9	118.3
Arno	2.2	20.1	116.1
Galt	6.2	26.3	109.9
Woodbridge	7.3	33.6	102.6
Lodi	3.0	36.6	99.6
Stockton	15.8	52.4	83.8
French Camp.....	5.0	57.4	78.8
Banta	11.9	69.3	66.9
Janney	7.0	76.3	59.9
Alta Mont.....	11.6	87.9	48.3
Greenville	2.7	90.6	45.6
Livermore	4.6	95.2	41.0
Dublin	10.3	105.5	30.7
East Oakland.....	22.1	127.6	8.6
Oakland	3.1	130.7	5.5
San Francisco....	5.5	136.2	0.0

Memphis-Clarendon, 93.2
Miles.

	Miles to	Total Miles	
	Out Return	Out Return	
Memphis	0.0	0.0	93.2
Ferry to Mound City, Ark.			
Marion	6.0	6.0	87.2
Madison	37.5	43.5	49.7
Forrest City.....	4.5	48.0	45.2
Beck's Spur.....	4.0	52.0	41.2
Goodwin	10.5	62.5	30.7
Wheatley	5.2	67.7	25.5
Brinkley	10.0	77.7	15.5
Clarendon	15.5	93.2	0.0

Clarendon-Hot Springs, 139.6
Miles.

	Miles to	Total Miles	
	Out Return	Out Return	
Clarendon	0.0	0.0	139.6
Ferry to Roe.			
Stuttgart	21.4	21.4	118.2
Hazen	20.5	41.9	97.7
Carlisle	9.0	50.9	88.7
Lonoka	11.1	62.0	77.6
Argenta	23.2	85.2	54.4
Little Rock	1.1	86.3	53.3
Collegeville	15.2	101.5	38.1
Benton	8.2	109.7	29.9
Fairplay Crossing	6.2	115.9	23.7
Fuller Crossing..	1.5	117.4	22.2
Lonsdale	6.8	124.2	15.4
Hot Springs	15.4	139.6	0.0

Hot Springs-Texarkana, 138.3
Miles.

	Miles to	Total Miles	
	Out Return	Out Return	
Hot Springs	0.0	0.0	138.3
Lawrence	6.4	6.4	131.9
Social Hill	18.9	25.3	113.0
Friendship	9.6	34.9	103.4
Arkadelphia	9.3	44.2	94.1
Dobyville	15.9	60.1	78.2
Okolona	6.0	66.1	72.2
Boughton	12.7	78.8	59.5
Prescott	5.2	84.0	54.3
Emmet	8.5	92.5	45.8
Hope	9.1	101.6	36.7
Fulton	14.2	115.8	22.5
Homan	7.8	123.6	14.7
Mandeville	8.3	131.9	6.4

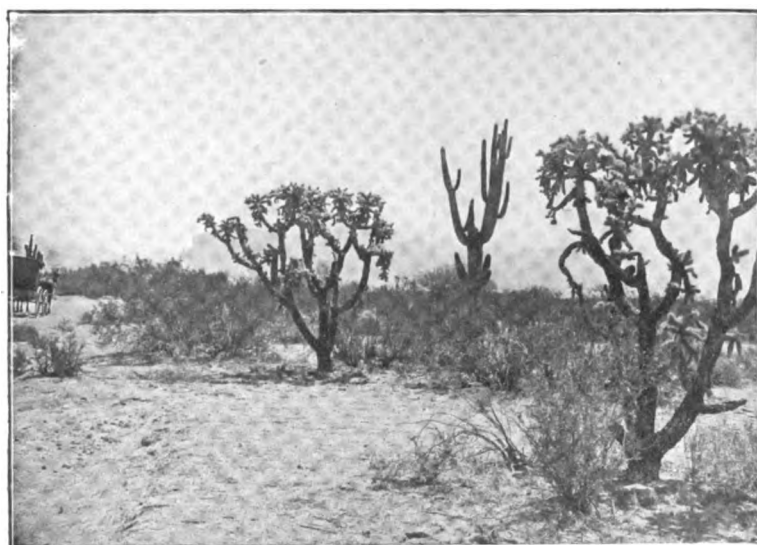
ITINERARY NO. 202.

Memphis to Los Angeles.

Night Stops—Memphis, Tenn.;
Clarendon, Hot Springs and
Texarkana, Ark.; Dallas,
Abilene, Big Spring, Fort
Stockton, Alpine, Sierra
Blanca and El Paso, Tex.;
Deming, N. M.; Willcox,
Tucson, Phoenix and Yuma,
Ariz.; El Centro, San Diego
and Los Angeles, Cal.
Eighteen Days, 2423.7 Miles.



Combination of Lake and Mountain Scenery Near Carson City, Nevada.



Desert Vegetation in Arizona—The Seraggly Cholla and Giant Cactus.

Texarkana 6.4 138.3 0.0

Texarkana-Dallas, 217 Miles.

	Miles to	Total Miles Out Return
Texarkana	0.0	0.0 217.0
Leary, Tex.....	10.4	10.4 206.6
Hooks	4.6	15.0 202.0
New Boston.....	7.3	22.3 194.7
Boston	1.3	23.6 193.4
De Kalb	12.7	36.3 180.7
Annona	19.2	55.5 161.5
Clarksville	9.4	64.9 152.1
Detroit	13.5	78.4 138.6
Blossom	9.0	87.4 129.6
Paris	9.7	97.1 119.9
Brookston	10.2	107.3 109.7
Hightown	2.7	110.0 107.0
Petty	3.6	113.6 103.4
Honey Grove.....	6.7	120.3 96.7
Windom	5.4	125.7 91.3
Dodd City	4.5	130.2 86.8
Bonham	6.3	136.5 80.5
Whitewright	15.4	151.9 65.1
Pilot Grove	6.4	158.3 58.7
Sedalla	5.8	164.1 52.9
Anna	7.2	171.3 45.7
Melissa	4.7	176.0 41.0
McKinney	7.7	183.7 33.3
Plano	14.1	197.8 19.2
Richardson	6.0	203.8 13.2
Vickery	6.1	209.9 7.1
Dallas	7.1	217.0 0.0

Dallas-Abilene, 207.1 Miles.

	Miles to	Total Miles Out Return
Dallas	0.0	0.0 207.1
Grand Prairie.....	13.1	13.1 194.0
Arlington	6.5	19.6 187.5
Handley	6.5	26.1 181.0
Fort Worth	5.5	31.6 175.5
Ben Brook	10.3	41.9 165.2
Aledo	9.9	51.8 155.3
Annetta	6.3	58.1 149.0
Weatherford	7.6	65.7 141.4
Mineral Wells.....	22.3	88.0 119.1
Palo Pinto	12.1	100.1 107.0
Caddo	26.6	126.7 80.4
Breckenridge	15.4	142.1 65.0
Albany	24.9	167.0 40.1

Hambly 33.3 200.3 6.8

Abilene 6.8 207.1 0.0

Abilene-Big Spring, 110.6 Miles.

	Miles to	Total Miles Out Return
Abilene	0.0	0.0 110.6
Tye Station	7.9	7.9 102.7
Merkel	8.3	16.2 94.4
Trent	6.5	22.7 87.9
Sweetwater	18.7	41.4 69.2
Roscoe	8.8	50.2 60.4
Loraine	10.9	61.1 49.5
Colorado	9.4	70.5 40.1
Westbrook	10.3	80.8 29.8
Intan	9.6	90.4 20.2
Conhonia	8.4	98.8 11.8
Big Spring	11.8	110.6 0.0

Big Spring-Fort Stockton, 177.7 Miles.

	Miles to	Total Miles Out Return
Big Spring	0.0	0.0 177.7
Stanton	24.2	24.2 153.5
Midland	19.4	43.6 134.1
Warfield	10.4	54.0 123.7
Odessa	12.0	66.0 111.7
Y Ranch	31.4	97.4 80.3
Acock Range	12.2	109.6 68.1
Edwards Ranch	7.2	116.8 60.9
Grand Falls	28.0	144.8 32.9
Fort Stockton.....	32.9	177.7 0.0

Fort Stockton-Alpine, 90.7 Miles.

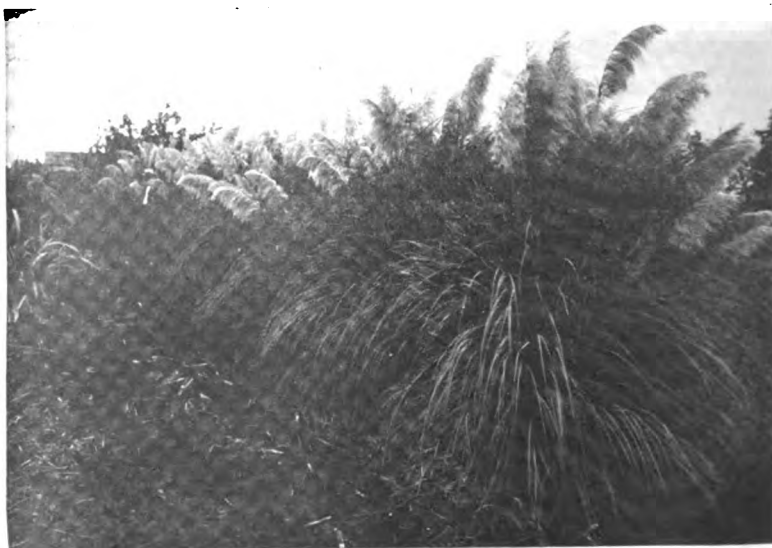
	Miles to	Total Miles Out Return
Fort Stockton ..	0.0	0.0 90.7
Marathon	58.3	58.3 32.4
Alpine	32.4	90.7 0.0

Alpine-Sierra Blanca, 131.6 Miles.

	Miles to	Total Miles Out Return
Alpine	0.0	0.0 131.6
Marfa	26.4	26.4 105.3
Aragon	10.9	37.3 94.3
Valentine	24.7	62.0 69.6
Wendell	8.7	70.7 60.9
Chispa	7.3	78.0 53.6
Lobo	12.0	90.0 41.6
Dalberg	13.5	103.5 28.1
Chocar	4.7	108.2 23.4
Torbert	4.4	112.6 19.0
Grayton	9.1	121.7 9.9
Sierra Blanca....	9.9	131.6 0.0

Sierra Blanca-El Paso, 92.4 Miles.

	Miles to	Total Miles Out Return
Sierra Blanca...	0.0	0.0 92.4
Etholen	4.3	4.3 88.1
Lasca	5.4	9.7 82.7
Finley	13.1	22.8 69.6
Fort Hancock.....	15.7	38.5 53.9
Polvo	13.8	52.3 40.1



A Glimpse of the Beautiful Foxtail Grass, Which Blooms on the Ranges in Central Texas.

Fabans 10.8 63.1 29.3
El Paso 29.3 92.4 0.0
El Paso-Deming, 103.2 Miles.

	Miles to	Total Miles	Out Return
El Paso	0.0	0.0	103.2
Montoya, N. M.	9.9	9.9	93.3
Canutillo	2.8	12.7	90.5
La Tuna	5.8	18.5	84.7
Berino	5.3	23.8	79.4
Mesquite	8.2	32.0	71.2
San Miguel	3.1	35.1	68.1
Afton	14.4	49.5	53.7
Kensin	2.8	52.3	50.9
Pronto	5.2	57.5	45.7
Aden	4.2	61.7	41.5
Cambray	12.9	74.6	28.6
Deming	28.6	103.2	0.0

Deming-Willcox, 137.1 Miles.

	Miles to	Total Miles	Out Return
Deming	0.0	0.0	137.1
Tunis	8.4	8.4	128.7
Gage	11.2	19.6	117.5
Willia	9.0	28.6	108.5
Ladina	5.7	34.3	102.8
Separ	5.8	40.1	97.0
Lisbon	9.2	49.3	87.8
Lordsburg	10.8	60.1	77.0
Stein's Pass	20.3	80.4	56.7
Vanar, Ariz.	7.5	87.9	49.2
San Simon	7.9	95.8	41.3
Holt	12.1	107.9	29.2
Bowie	4.4	112.3	24.8
Cholla	4.2	116.5	20.6
Luzena	3.4	119.9	17.2
Glade	9.3	129.2	7.9
Willcox	7.9	137.1	0.0

Willcox-Tucson, 89.2 Miles.

	Miles to	Total Miles	Out Return
Willcox	0.0	0.0	89.2
Cochise	11.1	11.1	78.1
Dragoon	9.8	20.9	68.3
Benson	18.7	39.6	49.6
Mescal	10.4	50.0	39.2
Vall	19.1	69.1	20.1
Esmond	4.5	73.6	15.6
Willmot	8.5	82.1	7.1
Tucson	7.1	89.2	0.0

Tucson-Phoenix, 126.8 Miles.

	Miles to	Total Miles	Out Return
Tucson	0.0	0.0	126.8
Rillito	18.2	18.2	108.6
Red Rock	16.2	34.4	92.4
Florence	34.5	68.9	57.9
Mesa	42.1	111.0	15.8
Tempe	7.0	118.0	8.8
Phoenix	8.8	126.8	0.0

Phoenix-Yuma, 206.9 Miles.

	Miles to	Total Miles	Out Return
Phoenix	0.0	0.0	206.9
Cashion	12.0	12.0	194.9
Coldwater	2.5	14.5	192.4
Liberty	12.0	26.5	180.4
Buckeye	6.0	32.5	174.4
Palo Verde	6.7	39.2	167.7
Arlington	11.0	50.2	156.7
Agua Caliente	42.7	92.9	114.0
Palomas	10.5	103.4	103.5
Castle Dome	59.3	162.7	44.2
Gila City	25.5	188.2	18.7
Done	0.5	188.7	18.2
Yuma	18.2	206.9	0.0

Yuma-El Centro, 102 Miles.

	Miles to	Total Miles	Out Return
Ogilby, Cal.	29.5	29.5	72.5
Yuma	0.0	0.0	102.0

Drylyn 7.3 34.8 65.2
Glamis 11.2 46.0 54.0
Mammoth 13.5 61.5 40.5
Brawley 27.0 88.5 13.5
Imperial 9.5 98.0 4.0
El Centro 4.0 102.0 0.0

El Centro-San Diego, 124.2 Miles.

	Miles to	Total Miles	Out Return
El Centro	0.0	0.0	124.2
Devil's Canyon	46.0	46.0	78.2
El Campo	25.5	71.5	52.7
Potrero	9.5	81.0	43.2
Dulzura	13.2	94.2	30.0
Jamul	8.5	102.7	21.5
Oakdale	1.7	104.4	19.8
Spring Valley	7.3	111.7	12.5
San Diego	12.5	124.2	0.0

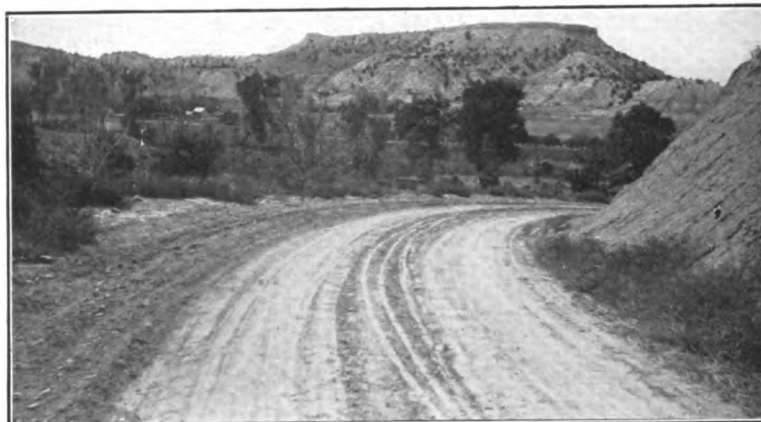
San Diego-Los Angeles, 136.1 Miles.

	Miles to	Total Miles	Out Return
San Diego	0.0	0.0	136.1
La Jolla	14.5	14.5	121.6
Del Mar	10.5	25.0	111.1
Encinitas	6.2	31.2	104.9
Merle	0.5	31.7	104.4

Rapid City, S. D.; Sundance and Sheridan, Wyo.; Billings, Bozeman, Butte, Missoula and Thompson Falls, Mont.; Wallace and Coeur d'Alene, Idaho; Spokane, Davenport, Waterville, Cle Elum and Seattle, Wash. Twenty-one Days, 2488.3 Miles.

Chicago-Warren, 139.8 Miles.

	Miles to	Total Miles	Out Return
Chicago	0.0	0.0	139.8
Oak Park	9.5	9.5	130.3
Maywood	2.5	12.0	127.8
Addison	8.2	20.2	119.6
Bloomington	5.3	25.5	114.3
Ontarioville	4.2	29.7	110.1
Elgin	8.0	37.7	102.1
McQueens	5.5	43.2	96.6
Harmony	10.5	53.7	86.1



Pikes Peak Transcontinental Trail Near Colorado Springs, Col.

La Costa	3.5	35.2	100.9	Coral	4.5	58.2	81.6
Carlsbad	5.2	40.4	95.7	Marengo	3.5	61.7	78.1
Oceanside	3.2	43.6	92.5	Garden Prairie	6.0	67.7	72.1
Stuart	4.7	48.3	87.8	Belvidere	6.0	73.7	66.1
Las Flores	3.0	51.3	84.8	Cherry Valley	6.7	80.4	59.4
San Luis Capistrano	23.5	74.8	61.3	Rockford	8.1	88.5	51.3
Irvine	14.2	89.0	47.1	Freeport	27.0	115.5	24.3
Tustin	6.0	95.0	41.1	Lina	12.5	128.0	11.8
Santa Ana	3.0	98.0	38.1	Wadhams	4.3	132.3	7.5
Anaheim	7.5	105.5	30.6	Nora	4.0	136.3	3.5
Fullerton	2.7	108.2	27.9	Warren	3.5	139.8	0.0
La Harba	5.0	113.2	22.9				
Bethel	5.7	118.9	17.2				
Whittier	3.2	122.1	14.0				
Montebello	4.0	126.1	10.0				
Los Angeles	10.0	136.1	0.0				

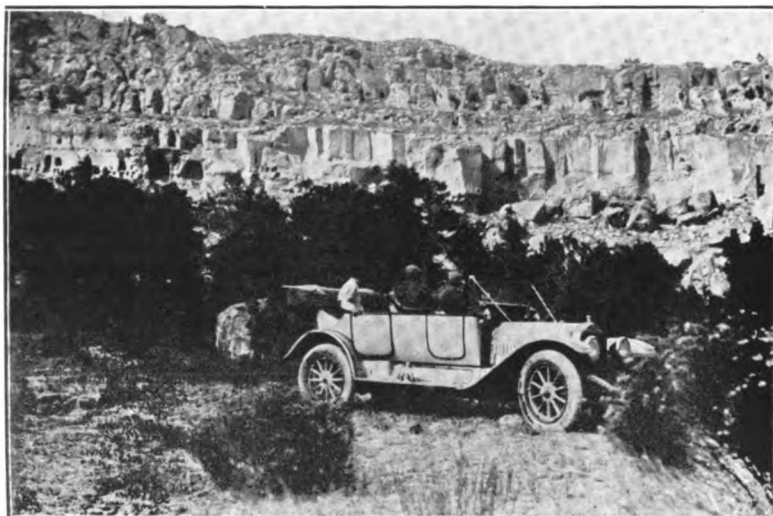
Warren-Waterloo, 136 Miles.

	Miles to	Total Miles	Out Return
Warren	0.0	0.0	136.0
Shullsburg, Wis.	15.5	15.5	120.5
Leadmine	6.0	21.5	114.5
Benton	4.5	26.0	110.0
Hazel Green	5.2	31.2	104.8
Fairplay	7.0	38.2	97.8
East Dubuque, Ill.	6.0	44.2	91.8
Dubuque, Ia.	1.3	45.5	90.5
Jullen	6.5	52.0	84.0
Centralia	3.2	55.2	80.8
Epworth	5.3	60.5	75.5
Farley	4.0	64.5	71.5
Dyersville	7.0	71.5	64.5
Earlville	8.0	79.5	56.5
Manchester	9.5	89.0	47.0
Independence	22.7	111.7	24.3

ITINERARY NO. 203.

Chicago-Seattle.

Night Stops—Chicago and Warren, Ill.; Waterloo, Fort Dodge and Sioux City, Ia.; Mitchell, Belvidere and



In the Land of the Cliff Dwellers in Western Colorado.

Jessup	8.3	120.0	16.0
Waterloo	16.0	136.0	0.0

Waterloo-Fort Dodge, 110.5 Miles.

	Miles to	Total Miles	
	Out	Return	
Waterloo	0.0	0.0	110.5
Cedar Falls	7.0	7.0	103.5
New Hartford	10.5	17.5	93.0
Parkersburg	9.0	26.5	84.0
Arlington	4.8	31.3	79.2
Austinville	4.0	35.3	75.2
Ackley	7.0	42.3	68.2
Iowa Falls	12.8	55.1	55.4
Alden	6.5	61.6	48.9
Wilkie	6.2	67.8	42.7
Williams	4.2	72.0	38.5
Blairsburg	6.0	78.0	32.5
Webster City	10.2	88.2	22.3
Fort Dodge	22.3	110.5	0.0

Fort Dodge-Sioux City, 135.5 Miles.

	Miles to	Total Miles	
	Out	Return	
Fort Dodge	0.0	0.0	135.5
Moorland	11.0	11.0	124.5
Rockwell City	21.0	32.0	103.5
Lytton	12.5	44.5	91.0
Sac City	7.5	52.0	83.5
Early	10.7	62.7	72.8
Shaller	9.7	72.4	63.1
Galva	7.3	79.7	55.8
Holstein	7.3	87.0	48.5
Cushing	7.0	94.0	41.5
Correctionville	5.5	99.5	36.0
Moville	17.0	116.5	19.0
Lawton	5.4	121.9	13.6
Sioux City	13.6	135.5	0.0

Sioux City-Mitchell, 164.5 Miles.

	Miles to	Total Miles	
	Out	Return	
Sioux City	0.0	0.0	164.5
Jefferson, S. D.	11.7	11.7	152.8
Elk Point	8.8	20.5	144.0
Hereford	32.7	53.2	111.3
Worthing	17.5	70.7	93.8
Sioux Falls	16.3	87.0	77.5
Bridgewater	41.0	128.0	36.5
Emery	10.0	138.0	26.5
Mitchell	26.5	164.5	0.0

Mitchell-Belvidere, 177.5 Miles.

	Miles to	Total Miles	
	Out	Return	
Mitchell	0.0	0.0	177.5
Mt. Vernon	11.5	11.5	166.0
Plankinton	13.0	24.5	153.0
White Lake	12.0	36.5	141.0
Kimball	14.0	50.5	127.0
Puckwana	13.0	63.5	114.0
Chamberlain	8.0	71.5	106.0
Oacoma	2.0	73.5	104.0
Reliance	12.0	85.5	92.0
Kennebec	14.0	99.5	78.0
Presho	11.0	110.5	67.0
Vivian	12.0	122.5	55.0
Draper	14.0	136.5	41.0
Murdo	9.0	145.5	32.0
Okaton	9.0	154.5	23.0
Stamford	8.0	162.5	15.0
Belvidere	15.0	177.5	0.0

Belvidere-Rapid City, 128 Miles.

	Miles to	Total Miles	
	Out	Return	
Belvidere	0.0	0.0	128.0

Kadoka	13.0	13.0	115.0
Weta	10.0	23.0	105.0
Interior	18.0	41.0	87.0
Conata	15.0	56.0	72.0
Imlay	12.0	68.0	60.0
Scenic	10.0	78.0	50.0
Creston	13.0	91.0	37.0
Farmingdale	14.0	105.0	23.0
Caputa	7.0	112.0	16.0
Rapid City	16.0	128.0	0.0

Rapid City-Sundance, 85 Miles.

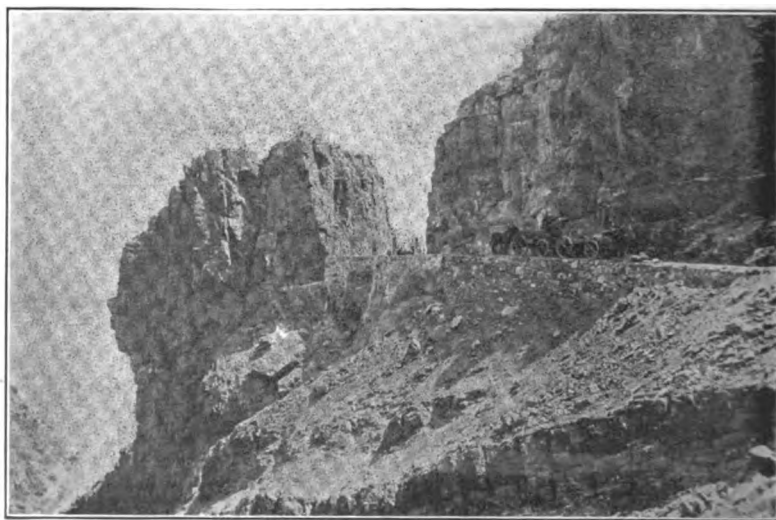
	Miles to	Total Miles	
	Out	Return	
Rapid City	0.0	0.0	85.0
Black Hawk	6.5	6.5	78.5
Piedmont	8.5	15.0	70.0
Tilford	5.5	20.5	64.5
Sturgis	9.5	30.0	55.0
Whitewood	8.0	38.0	47.0
Spearfish	12.0	50.0	35.0
Beulah, Wyo.	14.0	64.0	21.0
Sundance	21.0	85.0	0.0

Sundance-Sheridan, 165 Miles.

	Miles to	Total Miles	
	Out	Return	
Sundance	0.0	0.0	165.0
Currans	21.0	21.0	144.0
Moorcroft	10.0	31.0	134.0
Wessex	8.0	39.0	126.0
Roset	9.0	48.0	117.0
Minturn	9.0	57.0	108.0
Gillette	6.0	63.0	102.0
Sparta	5.0	68.0	97.0
Oriva	4.0	72.0	93.0
Felix	8.0	80.0	85.0
Croton	12.0	92.0	73.0
Lariat	11.0	103.0	62.0
Arvado	8.0	111.0	54.0
Regis	7.0	118.0	47.0
Cadiz	5.0	123.0	42.0
Cleamont	10.0	133.0	32.0
Ulm	8.0	141.0	24.0
Verona	9.0	150.0	15.0
Arno	10.0	160.0	5.0
Sheridan	5.0	165.0	0.0

Sheridan-Billings, 137 Miles.

	Miles to	Total Miles	
	Out	Return	
Sheridan	0.0	0.0	137.0
Ranchester	13.0	13.0	124.0
Parkman	12.0	25.0	112.0
Aberdeen, Wyo.	7.0	32.0	105.0
Wyola	5.0	37.0	100.0
Little Horn	10.0	47.0	90.0



Example of Recent Road Construction in the Mountains of Arizona.

Lodgegrass	6.0	53.0	84.0
Ionla	5.0	58.0	79.0
Garryowen	11.0	69.0	68.0
Crow Agency	5.0	74.0	63.0
Dunsmore	5.0	79.0	58.0
Harden	6.0	85.0	52.0
Perita	5.0	90.0	47.0
Toluca	11.0	101.0	36.0
Huntley	21.0	122.0	15.0
Lockwood	9.0	131.0	6.0
Billings	6.0	137.0	0.0

Billings-Bozeman, 142 Miles.

	Miles to	Total Miles	
	Out	Return	
Billings	0.0	0.0	142.0
Yegan	5.0	5.0	137.0
Laurel	12.0	17.0	125.0
Park City	10.0	27.0	115.0
Rapids	14.0	41.0	101.0
Columbus	7.0	48.0	94.0
Reedpoint	17.0	65.0	77.0
Greycliff	12.0	77.0	65.0
Big Timber	10.0	87.0	15.0
Springdale	9.0	96.0	46.0
Mission	13.0	109.0	33.0
Livingston	8.0	117.0	25.0
Muls	10.0	127.0	15.0
Chestnut	8.0	135.0	7.0
Bozeman	7.0	142.0	0.0

Bozeman-Butte, 118 Miles.

	Miles to	Total Miles	
	Out	Return	
Bozeman	0.0	0.0	118.0
Belgrade	10.0	10.0	108.0
Central Park	6.0	16.0	102.0
Manhattan	4.0	20.0	98.0
Logan	6.0	26.0	92.0
Three Forks	5.0	31.0	87.0
Willow Creek	9.0	40.0	78.0
Alcasar	18.0	58.0	60.0
Cardwell	4.0	62.0	56.0
Jefferson Island	12.0	74.0	44.0
Whitehead	4.0	78.0	40.0
Piedmont	5.0	83.0	35.0
Vendome	4.0	87.0	31.0
Cedric	5.0	92.0	26.0
Grace	4.0	96.0	22.0
Donald	5.0	101.0	17.0
Penfield	4.0	105.0	13.0
Janney	5.0	110.0	8.0
Butte	8.0	118.0	0.0

Butte-Missoula, 143 Miles.

	Miles to	Total Miles	
	Out	Return	
Butte	0.0	0.0	143.0
Silver Bow	6.0	6.0	137.0
Stuart	11.0	17.0	126.0
Warm Springs	7.0	24.0	119.0
Morel	4.0	28.0	115.0
Sinclair	10.0	38.0	105.0
Deer Lodge	8.0	46.0	97.0
Kohrs	9.0	55.0	88.0
Garrison	7.0	62.0	81.0
Gold Creek	10.0	72.0	71.0
Haskell	6.0	78.0	65.0
Drummond	8.0	86.0	57.0
Hell Gate	6.0	92.0	51.0
Bearmouth	14.0	106.0	37.0
Iris	10.0	116.0	27.0
Clinton	5.0	121.0	22.0
Thelma	6.0	127.0	16.0
Bonner	7.0	134.0	9.0
Missoula	9.0	143.0	0.0

Missoula-Thompson Falls, 116 Miles.

	Miles to	Total Miles	
	Out	Return	
Missoula	0.0	0.0	116.0
Desmet	8.0	8.0	108.0
Evans	10.0	18.0	98.0
Schley	7.0	25.0	91.0
Flathead	12.0	37.0	79.0

Ravalli	9.0	46.0	70.0
Dixon	8.0	54.0	62.0
Perma	12.0	66.0	50.0
Paradise	14.0	80.0	36.0
Plains	6.0	86.0	30.0
Meeksville	8.0	94.0	22.0
Eddy	9.0	103.0	13.0
Thompson Falls	13.0	116.0	0.0

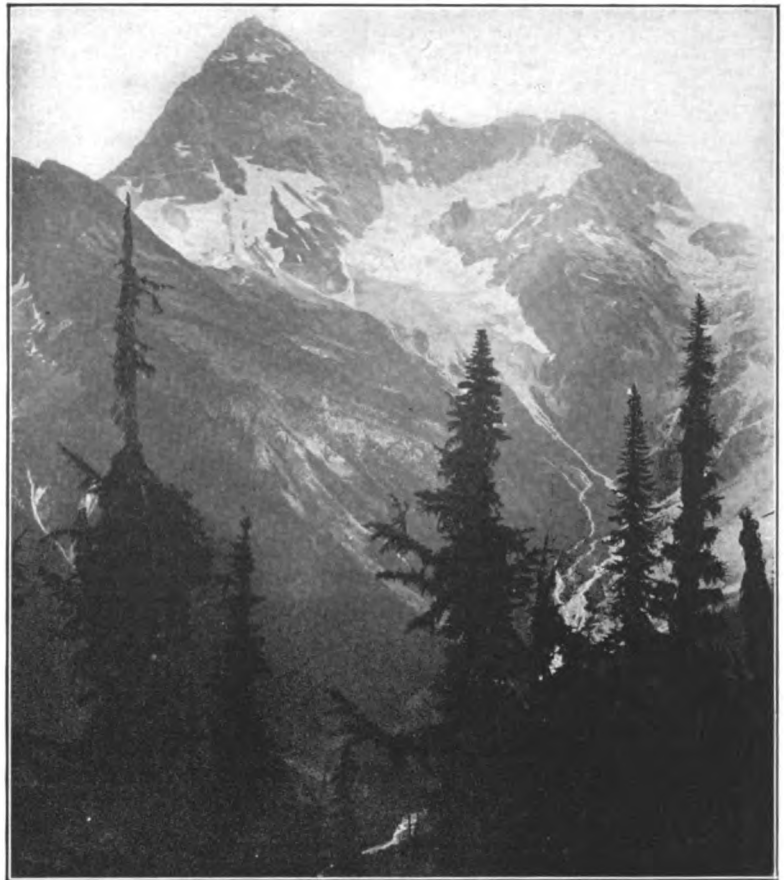
Thompson Falls-Wallace, 65.5 Miles.

	Miles to	Total Miles	
	Out	Return	
Thompson Falls	0.0	0.0	65.5
Paragon, Idaho	21.0	21.0	44.5
Sullivan	4.0	25.0	40.5
Raven	3.5	28.5	37.0

Dudley	10.0	38.0	32.0
Blue Creek	20.0	58.0	12.0
Coeur d'Alene	12.0	70.0	0.0

Coeur d'Alene-Spokane, 63 Miles.

	Miles to	Total Miles	
	Out	Return	
Coeur d'Alene	0.0	0.0	63.0
La Crosse	5.0	5.0	58.0
Grand Junction	10.0	15.0	48.0
McGuire	6.0	21.0	42.0
State Line	8.0	29.0	34.0
Spokane Bridge, Wash.	6.0	35.0	28.0
West Farms	7.0	42.0	21.0
Trent	6.0	48.0	15.0
Spokane	15.0	63.0	0.0

**Sir Donald's Great Glacier, British Columbia—Photo by Canadian Pacific.**

Littlefield	4.5	33.0	32.5
Murray	3.0	36.0	29.5
Union	4.0	40.0	25.5
Thiard	3.5	43.5	22.0
Delta	3.5	47.0	18.5
Carbon Centre	3.0	50.0	15.5
Sunset	4.5	54.5	11.0
Bradyville	5.0	59.5	6.0
Wallace	6.0	65.5	0.0

Wallace-Coeur d'Alene, 70 Miles.

	Miles to	Total Miles	
	Out	Return	
Wallace	0.0	0.0	70.0
Cataldo	28.0	28.0	42.0

Spokane-Davenport, 60 Miles.

	Miles to	Total Miles	
	Out	Return	
Spokane	0.0	0.0	60.0
Fort Wright	8.0	8.0	52.0
Lyons	6.0	14.0	46.0
Hite	15.0	29.0	31.0
Reardon	6.0	35.0	25.0
Mondovi	10.0	45.0	15.0
Davenport	15.0	60.0	0.0

Davenport-Waterville, 132 Miles.

	Miles to	Total Miles	
	Out	Return	
Davenport	0.0	0.0	132.0

Rocklyn	8.0	8.0	124.0
Telford	9.0	17.0	115.0
Creston	8.0	25.0	107.0
Wilbur	10.0	35.0	97.0
Govan	8.0	43.0	89.0
Almira	9.0	52.0	80.0
Hartline	12.0	64.0	68.0
Coulee Junction	15.0	79.0	53.0
Baird	15.0	94.0	38.0
Spencer	13.0	107.0	25.0
Farmer	10.0	117.0	15.0
Douglas	8.0	125.0	7.0
Waterville	7.0	132.0	0.0

Waterville-Cle Elum, 86 Miles.

Miles to		Total Miles	
		Out	Return
Waterville	0.0	0.0	86.0
Orondo	8.0	8.0	78.0
Wenatchee	17.0	25.0	61.0
Monitor	8.0	33.0	53.0
Cashmere	5.0	38.0	48.0
Dryden	6.0	44.0	42.0
Peshastin	5.0	49.0	37.0
Blewett	11.0	60.0	26.0
Liberty	14.0	74.0	12.0

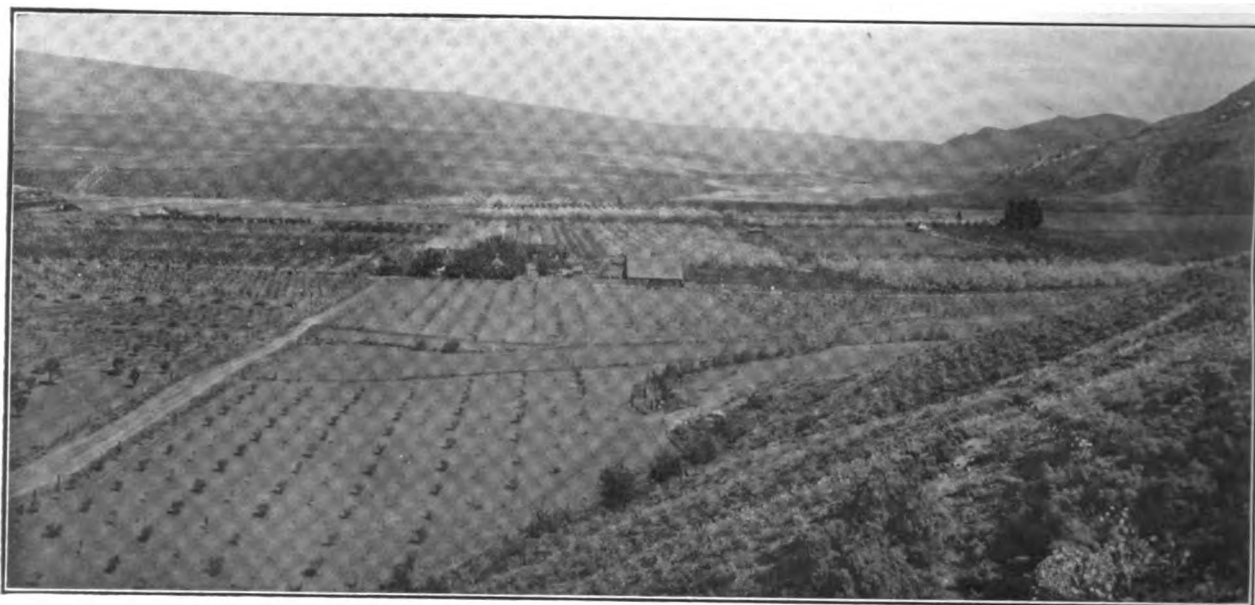
Milwaukee, Madison and La Crosse, Wis.; Minneapolis and Alexandria, Minn.; Fargo, Grand Forks, Devil's Lake, Towner, Berthold and Williston, N. D.; Culbertson, Glasgow, Malta, Havre, Great Falls and Helena, Mont. Seventeen Days, 1802.6 Miles.

Chicago-Milwaukee, 94 Miles.

Miles to		Total Miles	
		Out	Return
Chicago	0.0	0.0	94.0
Evanston	13.2	13.2	80.8
Hubbards Hill ..	5.8	19.0	75.0
Highland Park ..	6.5	25.5	68.5

Madison-La Crosse, 145.5 Miles.

Miles to		Total Miles	
		Out	Return
Madison	0.0	0.0	145.5
Ashton	10.0	10.0	135.5
Springfield Cor- ners	4.5	14.5	131.0
Sauk City	10.5	25.0	120.5
Prairie du Sac ..	1.5	26.5	119.0
Baraboo	15.7	42.2	103.3
Abelman	9.4	51.6	93.9
Reedsburg	8.2	59.8	85.7
Lavalle	7.8	67.6	77.9
Wonegan	7.5	74.6	70.9
Union Center ..	5.0	79.6	65.9
Elroy	4.5	84.1	61.4
Kendall	7.0	91.1	54.4
Ontario	13.7	104.8	40.7
Cashton	10.2	115.0	30.5
Portland	5.8	120.8	24.7
Middle Ridge ..	6.0	126.8	18.7
Newburg Corners	3.0	129.8	15.7
St. Joseph	2.5	132.3	13.2
La Crosse	13.2	145.5	0.0



In the Fruit Growing Country of Washington State: A Glimpse of Wenatchee Valley—Photo Copyrighted by Kiser Photo Company.

Cle Elum-Seattle, 114 Miles.

Miles to		Total Miles	
		Out	Return
Cle Elum	0.0	0.0	114.0
Nelson	16.0	16.0	98.0
Easton	7.0	23.0	91.0
Laconia	20.0	43.0	71.0
Edgewick	18.0	61.0	53.0
Northbend	5.0	66.0	48.0
Fall City	13.0	79.0	35.0
Isaquak	11.0	90.0	24.0
Black River	13.0	103.0	11.0
South Park	6.0	109.0	5.0
Seattle	5.0	114.0	0.0

ITINERARY NO. 204.

Chicago to Helena.

Night Stops—Chicago, Ill.;

La Crosse-Minneapolis, 172 Miles.

Miles to		Total Miles	
		Out	Return
La Crosse	0.0	0.0	172.0
La Crescent, Minn.	3.3	3.3	168.7
Ridgeway	17.7	21.0	151.0
Witoka	3.5	24.5	147.5
Winona	9.5	34.0	138.0
Lewiston	14.5	48.5	123.5
Utica	4.7	53.2	118.8
St. Charles	5.8	59.0	113.0
Dover	3.6	62.6	109.4
Eyota	5.2	67.8	104.2
Chester	6.8	74.6	97.4
Rochester	6.5	81.1	90.9
Oronoco	11.0	92.1	79.9
Pine Island	7.0	99.1	72.9
Zumbrota	6.5	105.6	66.4
Hader	8.4	114.0	58.0
Wastedo	3.5	117.5	54.5
Cannon Falls ..	8.0	125.5	46.5
Rich Valley	20.7	146.2	25.8

Milwaukee-Madison, 81.3 Miles.

Miles to		Total Miles	
		Out	Return
Milwaukee	0.0	0.0	81.3
Brookfield	13.0	13.0	68.3
Waukesha	4.0	17.0	64.3
Delafield	10.7	27.7	53.6
Concord	11.1	38.8	42.5
Johnson's Creek	9.4	48.2	33.1
Astalan	4.2	52.4	28.9
Lake Mills	2.5	54.9	26.4
Vilas	18.0	72.9	8.4
Madison	8.4	81.3	0.0



Laggoa Alta, Lakes in the Clouds, B. C.—Photo by Canadian Pacific.

Westcott	6.0	152.2	19.8
St. Paul	10.0	162.2	9.8
Minneapolis	9.8	172.0	0.0

Minneapolis-Alexandria, 140 Miles.

	Miles to	Total Miles	Out Return
Minneapolis	0.0	0.0	140.0
Crystal Lake	5.0	5.0	135.0
Robinsonville	0.5	5.5	134.5
Osseo	6.8	12.3	127.7
Anoka	6.2	18.5	121.5
Dayton	8.0	26.5	113.5
Elk River	3.5	30.0	110.0
Becker	17.0	47.0	93.0
Clear Lake	7.0	54.0	86.0
Cable	6.0	60.0	80.0
St. Cloud	6.3	66.3	73.7
St. Joseph	7.3	73.6	66.4
Avon	7.3	80.9	59.1
Albany	7.0	87.9	52.1
Freeport	8.5	96.4	43.6
Melrose	6.5	102.9	37.1
Sauk Center	9.0	111.9	28.1
Onakia	17.0	128.9	11.1
Alexandria	11.1	140.0	0.0

Alexandria-Fargo, 124.2 Miles.

	Miles to	Total Miles	Out Return
Alexandria	0.0	0.0	124.2
Garfield	7.1	7.1	117.1
Brandon	6.5	13.6	110.6
Evansville	6.2	19.8	104.4
Melby	6.0	25.8	98.4
Ashby	4.3	30.1	94.1
Fergus Falls	24.2	54.3	69.9
Rothsay	23.0	77.3	46.9
Barneville	17.0	94.3	29.9
Baker	8.5	102.8	21.4
Moorehead	19.7	122.5	1.7
Fargo, N. D.	1.7	124.2	0.0

Fargo-Grand Forks, 99.5 Miles.

	Miles to	Total Miles	Out Return
Fargo	0.0	0.0	99.5
Mapleton	13.5	13.5	82.0
Hillsboro	40.8	54.3	41.2
Taft	3.5	57.8	37.7
Buxton	11.4	69.2	26.3
Reynolds	5.5	74.7	20.8

Thompson	7.2	81.9	13.6
Merrifield	4.7	86.6	8.9
Grand Forks	8.9	95.5	0.0

Grand Forks-Devil's Lake, 99.5 Miles.

	Miles to	Total Miles	Out Return
Grand Forks	0.0	0.0	99.5
Ojata	12.7	12.7	86.8
Emerado	4.3	17.0	82.5
Arvilla	5.8	22.8	76.7
Larimore	6.0	28.8	70.7
McCanna	10.0	38.8	60.7
Niagara	7.5	46.3	53.2
Petersburg	6.5	52.8	46.7
Michigan	6.5	59.3	40.2
Mapes	5.7	65.0	34.5
Lakota	6.0	71.0	28.5
Bartlett	4.0	75.0	24.5
Dayen	5.0	80.0	19.5
Crary	5.5	85.5	14.0
Devil's Lake	14.0	99.5	0.0

Devil's Lake-Towner, 87.2 Miles.

	Miles to	Total Miles	Out Return
Devil's Lake	0.0	0.0	87.2
Churches Ferry	30.0	30.0	57.2
Leeds	6.0	36.0	51.2
York	7.0	43.0	44.2
Knox	7.8	50.8	36.4
Pleasant Lake	4.2	55.0	32.2
Fero	7.0	62.0	25.2
Rugby	4.5	66.5	20.7
Turnbridge	5.0	71.5	15.7
Towner	15.7	87.2	0.0

Towner-Berthold, 75.2 Miles.

	Miles to	Total Miles	Out Return
Towner	0.0	0.0	75.2
Denbigh	13.3	13.3	61.9
Granville	14.5	27.8	47.4
Surrey	15.3	43.1	32.1
Minot	8.0	51.1	24.1
Burlington	8.3	59.4	15.8
Berthold	15.8	75.2	0.0

Berthold-Williston, 113 Miles.

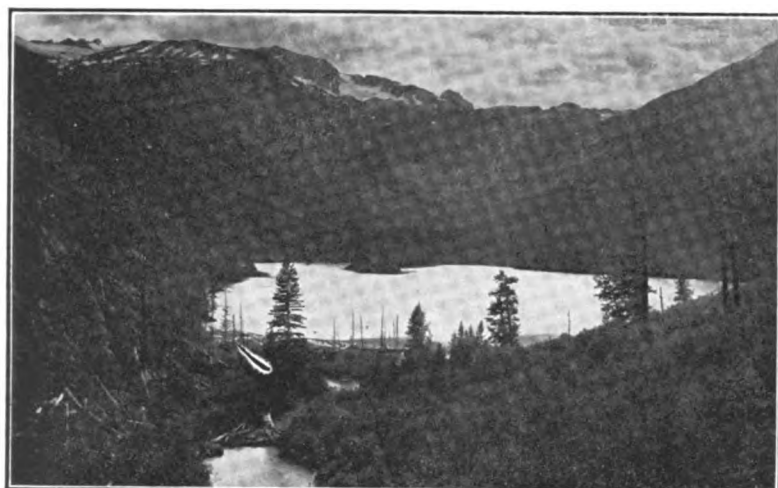
	Miles to	Total Miles	Out Return
Berthold	0.0	0.0	113.0
Tagus	10.0	10.0	103.0
Blaisdell	12.5	22.5	90.5
Palermo	7.3	29.8	83.2
Stanley	8.5	38.3	74.7
Ross	6.7	45.0	68.0
White Earth	13.5	58.5	54.5
Tloga	10.5	69.0	44.0
Ray	11.7	80.7	32.3
Williston	32.3	113.0	0.0

Williston-Culbertson, 64.3 Miles.

	Miles to	Total Miles	Out Return
Williston	0.0	0.0	64.3
Buford	33.0	33.0	31.3
Mondak	2.0	35.0	29.3
Lakeside, Mont.	8.5	43.5	20.8
Bainville	5.6	49.1	15.2
Lanark	7.2	56.3	8.0
Culbertson	8.0	64.3	0.0



Along the Shore of Lake Harriet, Near the City of Minneapolis, Minn.—Photo by F. Raetz.



Hart Lake in the Lake Chelan District of Montana—Photo by Great Northern Railway.

Culbertson-Glasgow, 109.7 Miles.

	Miles to	Total Miles
	Out	Return
Culbertson	0.0	0.0 109.7
Fort Peck	7.5	7.5 102.2
Brockton	13.5	21.0 88.7
Popular	14.0	35.0 74.7
Chelsea	8.3	43.3 66.4
Frazer	34.5	77.8 31.9
Wlota	10.3	88.1 21.6
Nashua	6.5	94.6 15.1
Glasgow	15.1	109.7 0.0

Glasgow-Malta, 77.7 Miles.

	Miles to	Total Miles
	Out	Return
Glasgow	0.0	0.0 77.7
Lahr Ranch	13.3	13.3 64.4
Vandalla	5.3	18.6 59.1
Hinsdale	11.5	30.1 47.6
Bowdoin	39.5	69.6 8.1
Malta	8.1	77.7 0.0

Malta-Havre, 95 Miles.

	Miles to	Total Miles
	Out	Return
Malta	0.0	0.0 95.0
Dodson	21.0	21.0 74.0
Coberg	10.3	31.3 63.7
Savoy	5.0	36.3 58.7
Harlem	13.7	50.0 45.0
Zurick	11.0	61.0 34.0
Chinook	8.7	69.7 25.3
Havre	25.3	95.0 0.0

Havre-Great Falls, 118.5 Miles.

	Miles to	Total Miles
	Out	Return
Havre	0.0	0.0 118.5
Ft. Assiniboine	6.8	6.8 111.7
Big Sandy	28.5	35.3 83.2
Teton	32.5	67.8 50.7
Ft. Benton	7.2	75.0 43.5
Great Falls	43.5	118.5 0.0

Great Falls-Helena, 110 Miles.

	Miles to	Total Miles
	Out	Return
Great Falls	0.0	0.0 110.0
Cascade Hotel	28.5	28.5 81.5
St. Peter's Mission	14.0	42.5 67.5
Sullivan Hill	5.5	48.0 62.0
Wolf Creek	23.5	71.5 38.5
Silver	22.2	93.7 16.3
Helena	16.3	110.0 0.0

ITINERARY NO. 205.

St. Louis to Forrest City.

Night Stops—St. Louis, Ste. Genevieve and Cape Girardeau, Mo.; Rector, Jonesboro and Forrest City, Ark. Five Days, 392 Miles.

St. Louis-Ste. Genevieve, 104 Miles.

	Miles to	Total Miles
	Out	Return
St. Louis	0.0	0.0 104.0
Maxville	19.0	19.0 85.0
Antonia	7.5	26.5 77.5

Hillsboro	11.5	38.0 66.0
Victoria	4.5	42.5 61.5
De Soto	3.5	46.0 58.0
Bonne Terre	16.5	62.5 41.5
Desloge	4.5	67.0 37.0
St. Francois	1.0	68.0 66.0
Flat River	0.7	68.7 35.3
Farmington	7.8	76.5 27.5
Valley Forge	2.7	79.2 24.8
Weingarten	12.5	91.7 12.3
New Offenbourg	2.0	93.7 10.3
Ste. Genevieve	10.3	104.0 0.0

Ste. Genevieve-Cape Girardeau, 65 Miles.

	Miles to	Total Miles
	Out	Return
Ste. Genevieve	0.0	0.0 65.0
Perryville	23.7	23.7 41.3
Longtown	6.8	30.5 34.5
Uniontown	5.2	35.7 29.3
Appleton	1.3	37.0 28.0
Fruitland	12.0	49.0 16.0
Jackson	5.2	54.2 10.8
Cape Girardeau	10.8	65.0 0.0

Cape Girardeau-Rector, 104 Miles.

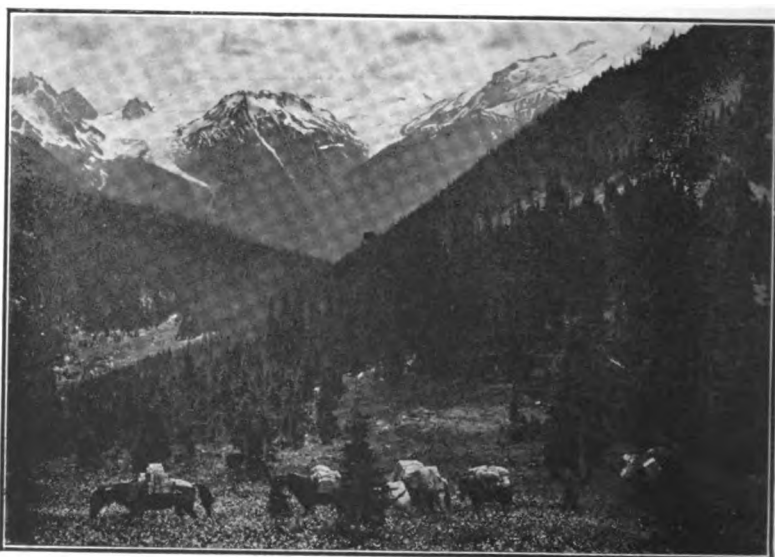
	Miles to	Total Miles
	Out	Return
Cape Girardeau	0.0	0.0 104.0
Dutchtown	9.5	9.5 34.5
Allenville	6.0	15.5 88.5
Aquilla	28.0	41.5 63.5
Bloomfield	5.3	46.8 57.2
Dexter	7.0	53.8 50.3
Campbell	26.0	79.8 24.3
St. Francis, Ark.	4.5	84.3 19.7
Piggott	9.0	93.3 10.7
Rector	10.7	104.0 0.0

Rector-Jonesboro, 49.5 Miles.

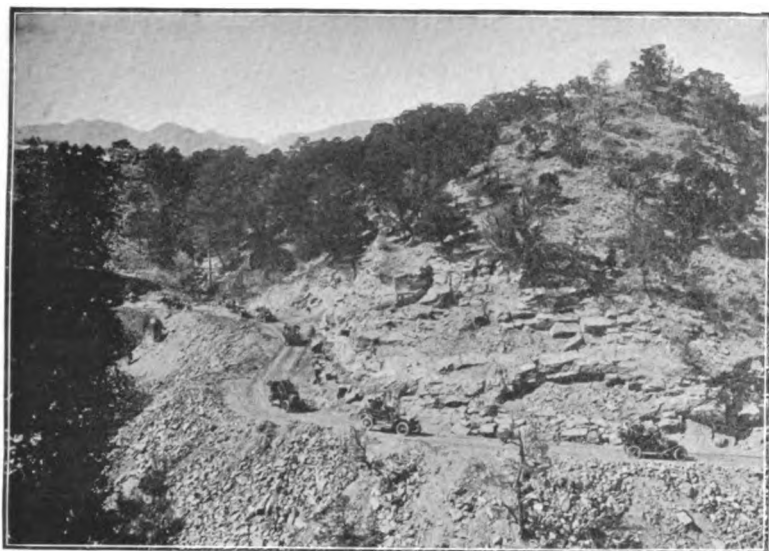
	Miles to	Total Miles
	Out	Return
Rector	0.0	0.0 49.5
Marmaduke	10.7	10.7 38.8
Paragould	14.3	25.0 24.5
Brookland	13.5	38.5 11.0
Jonesboro	11.0	49.5 0.0

Jonesboro-Forrest City, 69.5 Miles.

	Miles to	Total Miles
	Out	Return
Jonesboro	0.0	0.0 69.5



Buck Creek Pass, Near Glacier Peak, Cascade Mountains, Montana—Photo Copyrighted by Kiser Photo Company.



New Automobile Road Over the Ute Pass in Colorado.

Greenfield	17.7	17.7	51.8
Harrisburg	5.3	23.0	46.5
Whitehall	7.5	30.5	39.0
Wynne	20.5	51.0	18.5
Forrest City	18.5	69.5	0.0

ITINERARY NO. 206.

Winnipeg-Galveston.

Night Stops—Winnipeg, Man.; Pembina, Grand Forks and Fargo, N. D.; Ortonville, Minn.; Brookings, S. D.; Sioux City, Ia.; Omaha, Neb.; Hiawatha, Topeka, Emporia and Wichita, Kan.; Enid, Oklahoma City and Lawton, Okla.; Wichita Falls, Fort Worth, Waco, Bryan, Houston and Galveston, Tex. Twenty Days, 2023.9 Miles.

Winnipeg-Pembina, 73 Miles.

	Miles to	Total Miles
	Out	Return
Winnipeg	0.0	0.0 73.0
St. Norbert	9.9	9.9 63.1
St. Nacarde	13.6	23.5 49.5
Morris	18.0	41.5 31.5
St. Jean Baptiste	6.2	47.7 25.3
Letellier	8.8	56.5 16.5
Emerson	12.5	69.0 4.0
Pembina, N. D.	4.0	73.0 0.0

Pembina-Grand Forks, 85.5 Miles.

	Miles to	Total Miles
	Out	Return
Pembina	0.0	0.0
Hamilton	17.6	17.6
Glasston	6.9	24.5
St. Thomas	6.3	30.8
Auburn	7.0	37.8
Grafton	6.8	44.6

Minto	10.4	55.0	30.5
Ardock	6.7	61.7	23.8
Manvel	12.3	74.0	11.5
Grand Forks	11.5	85.5	0.0

Grand Forks-Fargo, 95.5 Miles.

	Miles to	Total Miles
	Out	Return
Grand Forks	0.0	0.0 95.5
Merrifield	8.9	8.9 86.6
Thompson	4.7	13.6 81.9
Reynolds	7.2	20.8 74.7
Buxton	5.5	26.3 69.2
Taft	11.4	37.7 57.8
Hillsboro	3.5	41.2 54.3
Mapleton	40.8	82.0 13.5
Fargo	13.5	95.5 0.0

Fargo-Ortonville, 124 Miles.

	Miles to	Total Miles	
	Out	Return	
Fargo	0.0	0.0	124.0
Saunders	4.5	4.5	119.5
Wild Rice	4.0	8.5	115.5

Hickson	7.2	15.7	108.3
Christine	5.8	21.5	102.5
Abercrombie	11.5	33.0	91.0
Dwight	10.0	43.0	81.0
Wakpeton	8.5	51.5	72.5
Tyler	8.0	59.5	64.5
Fairmont	6.5	66.0	58.0
Blackmer	6.2	72.2	51.8
White Rock, Minn.	4.5	76.7	47.3
Wheaton	10.5	87.2	36.8
Dumont	7.3	94.5	29.5
Collis	3.5	98.0	26.0
Graceville	6.5	104.5	19.5
Clinton	7.0	111.5	12.5
Ortonville	12.5	124.0	0.0

Ortonville-Brookings, 89 Miles.

	Miles to	Total Miles
	Out	Return
Ortonville	0.0	0.0
Big Stone City, S. D.	1.0	1.0
Mill Bank	13.5	14.5
La Bolt	13.5	28.0
Altamont	14.5	42.5
Clear Lake	7.0	49.5
Toronto	14.0	63.5
Brookings	25.5	89.0
		89.0

Brookings-Sioux City, 145.3 Miles.

	Miles to	Total Miles
	Out	Return
Brookings	0.0	0.0 145.3
Dell Rapids	38.0	38.0 107.3
Sioux Falls	20.0	58.0 87.3
Worthing	16.5	74.5 70.8
Beresford	17.5	92.0 53.3
Elk Point	32.8	124.8 20.5
Jefferson	15.5	140.3 5.0
Sioux City, Ia.	5.0	145.3 0.0

Sioux City-Omaha, 109.1 Miles.

	Miles to	Total Miles
	Out	Return
Sioux City	0.0	0.0
Salix	16.5	16.5
Sloan	7.5	24.0
Whitney	10.7	34.7
Omawa	8.0	42.7
River Sioux	16.3	59.0
Missouri Valley	22.5	81.5
Loveland	4.5	86.0
Honey Creek	4.5	90.5
Crescent	6.2	96.7



Scenic Grandeur of the Grand Canyon of the Yellowstone.

Council Bluffs ..	8.0	104.7	4.4
Omaha, Neb.....	4.4	109.1	0.0

Omaha-Hiawatha, 123 Miles.

	Miles to	Total Miles	Out Return
Omaha	0.0	0.0	123.0
South Omaha ..	4.2	4.2	118.8
Albright	3.0	7.2	115.8
Fort Crook	3.0	10.2	112.8
La Platte	4.0	14.2	108.8
Plattsmouth	6.2	20.4	102.6
Mynard	3.5	23.9	99.1
Murray	4.0	27.9	95.1
Wyoming	13.0	40.9	82.1
Nebraska City...	7.2	48.1	74.9
Julian	10.5	58.6	64.4
Auburn	10.0	68.6	54.4
Howe	6.2	74.8	48.2
Stella	8.5	83.3	39.7
Verdon	9.5	92.8	30.2
Falls City	11.5	104.3	18.7
Hiawatha, Kan..	18.7	123.0	0.0

Hiawatha-Topeka, 70.5 Miles.

	Miles to	Total Miles	Out Return
Hiawatha	0.0	0.0	70.5
Horton	14.0	14.0	56.5

Clements	7.7	35.7	72.8
Cedar Point	6.5	42.2	66.3
Florence	6.7	48.9	59.6
Peabody	14.8	63.7	44.8
Walton	11.6	75.3	33.2
Newton	8.2	83.5	25.0
Wichita	25.0	108.5	0.0

Wichita-Enid, 117 Miles.

	Miles to	Total Miles	Out Return
Wichita	0.0	0.0	117.0
Wellington	31.2	31.2	85.8
South Haven	15.0	46.2	70.8
Druey	5.3	51.5	65.5
Caldwell	6.5	58.0	59.0
Renfrow, Okla..	10.0	68.0	49.0
Medford	12.5	80.5	36.5
Pond Creek	12.5	93.0	24.0
Kremlin	10.0	103.0	14.0
Enid	14.0	117.0	0.0

Enid-Oklahoma City, 96.5 Miles.

	Miles to	Total Miles	Out Return
Enid	0.0	0.0	96.5
Waukomis	8.0	8.0	88.5

Geronimo	10.0	10.0	59.5
Emerson	9.0	19.0	41.5
Randlett	15.0	34.0	26.5
Burkburn'tt, Tex.	11.5	45.5	15.0
Wichita Falls...	15.0	60.5	0.0

Wichita Falls-Fort Worth, 125 Miles.

	Miles to	Total Miles	Out Return
Wichita Falls ..	0.0	0.0	125.0
Henrietta	25.0	25.0	100.0
Bellevue	15.5	40.5	84.5
Bowie	16.0	56.5	68.5
Fruitland	8.0	64.5	60.5
Sunset	11.0	75.5	49.5
Decatur	12.0	87.5	37.5
Rhome	10.5	98.0	27.5
Saginaw	16.0	114.0	11.5
Fort Worth	11.5	125.0	0.0

Fort Worth-Waco, 135 Miles.

	Miles to	Total Miles	Out Return
Fort Worth	0.0	0.0	135.0
Crowley	20.0	20.0	115.0
Cleburne	18.0	38.0	97.0
George's Creek ..	14.0	52.0	83.0



Irrigation Farming on the Prairies of the Great Northwest: The Buford-Trenton Project, Looking East from Buford, N. D.—Photo by Great Northern Railway.

Whiting	9.5	23.5	47.0
Holton	15.0	38.5	32.0
Mayetta	9.3	47.8	22.7
Hoyt	7.0	54.8	15.7
Topeka	15.7	70.5	0.0

Topeka-Emporia, 75.5 Miles.

	Miles to	Total Miles	Out Return
Topeka	0.0	0.0	75.5
Wakarusa	12.5	12.5	63.0
Scranton	10.5	23.0	52.5
Burlingame	6.8	29.8	45.7
Osage City	10.2	40.0	35.5
Lebo	15.5	55.5	20.0
Emporia	20.0	75.5	0.0

Emporia-Wichita, 108.5 Miles.

	Miles to	Total Miles	Out Return
Emporia	0.0	0.0	108.5
Plymouth	8.5	8.5	100.0
Saffordville	3.5	12.0	96.5
Ellinor	2.0	14.0	94.5
Cottonwood Falls	7.8	21.8	86.7
Elmdale	6.2	28.0	80.5

Bison	6.5	14.5	85.0
Tennesseey	7.0	21.5	75.0
Dover	11.0	32.5	64.0
Kingfisher	11.8	44.3	52.2
El Reno	25.2	69.5	27.0
Oklahoma City..	27.0	96.5	0.0

Oklahoma City-Lawton, 141.5 Miles.

	Miles to	Total Miles	Out Return
Oklahoma City..	0.0	0.0	141.5
El Reno	27.0	27.0	114.5
Pocasset	37.0	64.0	77.5
Chickasha	11.0	75.0	66.5
Anadarko	21.0	96.0	45.5
Apache	18.7	114.7	26.8
Rohrer	13.0	127.7	13.8
Lawton	13.8	141.5	0.0

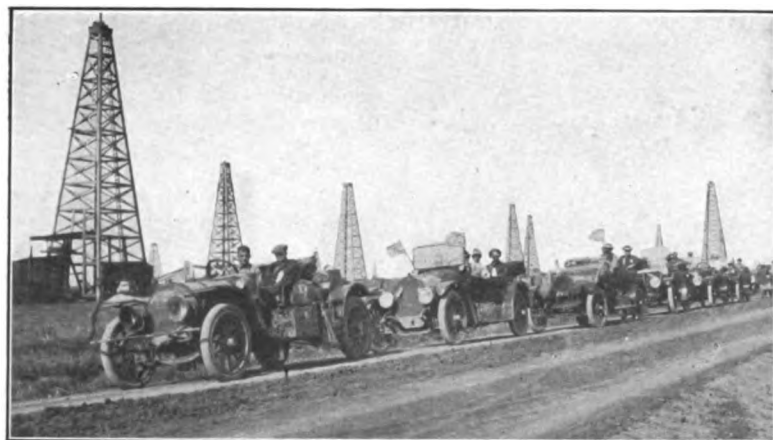
Lawton-Wichita Falls, 60.5 Miles.

	Miles to	Total Miles	Out Return
Lawton	0.0	0.0	60.5

Nemo	5.5	57.5	77.5
Rainbow	4.5	62.0	73.0
Glenrose	4.0	66.0	69.0
Walnut Springs	12.0	78.0	57.0
Meridian	9.0	87.0	48.0
Clifton	13.0	100.0	35.0
Valley Mills	10.0	110.0	25.0
China Springs ..	12.0	122.0	13.0
Waco	13.0	135.0	0.0

Waco-Bryan, 85.5 Miles.

	Miles to	Total Miles	Out Return
Waco	0.0	0.0	85.5
Battle	12.0	12.0	73.5
Reese	5.5	17.5	68.0
Perry	5.5	23.0	61.5
Marlin	8.0	31.0	53.5
Regan	7.0	38.0	46.5
Bremond	9.0	47.0	37.5
Calvert	12.0	59.0	25.5
Carne	8.0	67.0	17.5
Sutton	5.0	72.0	12.5
Bentley	6.0	78.0	7.5
Bryan	7.5	85.5	0.0



Typical Scene in the Oil Field District of Texas and Oklahoma.

Bryan-Houston, 105.5 Miles.

	Miles to	Total Miles	Out Return
Bryan	0.0	0.0	105.5
Myers	7.5	7.5	98.0
Wellborn	7.0	14.5	91.0
Millican	6.0	20.5	85.0
Nevasota	10.0	30.5	75.0
Courtney	8.0	38.5	67.0
Howth	5.0	43.5	62.0
Hemstead	4.5	48.0	57.5
Prairie View	5.5	53.5	52.0
Waller	6.0	59.5	46.0
Hockley	10.0	69.5	36.0
Cypress	11.5	81.0	24.5
Latsuma	7.5	88.5	17.0
Fairbanks	5.0	93.5	12.0
Houston	12.0	105.5	0.0

Houston-Galveston, 58.5 Miles.

	Miles to	Total Miles	Out Return
Houston	0.0	0.0	58.5
South Houston	8.5	8.5	50.0
Seabrook	6.0	14.5	44.0
League City	11.0	25.5	33.0
Dickinson	8.5	34.0	24.5
Texas City	9.5	43.5	15.0
Galveston	15.0	58.5	0.0

ITINERARY NO. 207.**Denver to Phoenix.**

Night Stops—Denver, Colorado Springs, Pueblo and Trinidad, Col.; Las Vegas, Santa Fe, Albuquerque and McCarty, N. M.; Springerville, Globe and Phoenix, Ariz. Ten Days, 942 Miles.

Denver-Colorado Springs, 69.2 Miles.

	Miles to	Total Miles	Out Return
Denver	0.0	0.0	69.2
Littleton	9.0	9.0	60.2
Ascequia	7.0	16.0	53.2
Gann	3.5	19.5	49.7
Sedalia	3.8	23.3	45.9
Perry Park	14.0	37.3	31.9

Palmer Lake	9.2	46.5	22.7
Monument Lake	3.0	49.5	19.7
Pring	3.5	53.0	16.2
Custard	2.5	55.5	13.7
Breed	5.7	61.2	8.0
Pike View	3.5	64.7	4.5
Colorado Springs	4.5	69.2	0.0

Colorado Springs-Pueblo, 42.5 Miles.

	Miles to	Total Miles	Out Return
Colorado Springs	0.0	0.0	42.5
Kelker	4.5	4.5	38.0
Fountain	8.5	13.0	29.5
Buttes	7.3	20.3	22.2
Pinlon	10.5	30.8	11.7
Bragdon	3.5	34.3	8.2
Eden	2.0	36.3	6.2
Pueblo	6.2	42.5	0.0

Pueblo-Trinidad, 90 Miles.

	Miles to	Total Miles	Out Return
Pueblo	0.0	0.0	90.0
Walsenburg	50.5	50.5	39.5
Pryor	10.0	60.5	29.5
Acullar	9.3	69.8	20.2
Chicosa	10.2	80.0	10.0
Bowen	4.5	84.5	5.5
Trinidad	5.5	90.0	0.0

Trinidad-Las Vegas, 141 Miles.

	Miles to	Total Miles	Out Return
Trinidad	0.0	0.0	141.0
Starkville	4.0	4.0	137.0
Gallinas	5.0	9.0	132.0
Morley	2.3	11.3	129.7
Raton, N. M.	14.0	25.3	115.7
Dorsey	17.2	42.5	98.5
Maxwell	11.5	54.0	87.0
French	5.0	59.0	82.0
Springer	10.7	69.7	71.3
Rayado	5.8	75.5	65.5
Colmor	4.8	80.3	60.7
Nolan	4.0	84.3	56.7
Wagon Mound	13.3	97.6	43.4
Watrous	23.0	120.6	20.4
Onara	9.7	130.3	10.7
Arriba	8.5	138.8	2.2
Las Vegas	2.2	141.0	0.0

Las Vegas-Santa Fe, 75.3 Miles.

	Miles to	Total Miles	Out Return
Las Vegas	0.0	0.0	75.3
Tecolote	12.0	12.0	63.3
Bernal	6.3	18.3	57.0
Fulton	15.3	33.6	41.7
Pajarita	7.0	40.6	34.7
Rowe	2.3	42.9	32.4
Pecos	6.7	49.6	25.7
Glorieta	6.0	55.6	19.7
Canoncito	4.5	60.1	15.2
Santa Fe	15.2	75.3	0.0

Santa Fe-Albuquerque, 66.7 Miles.

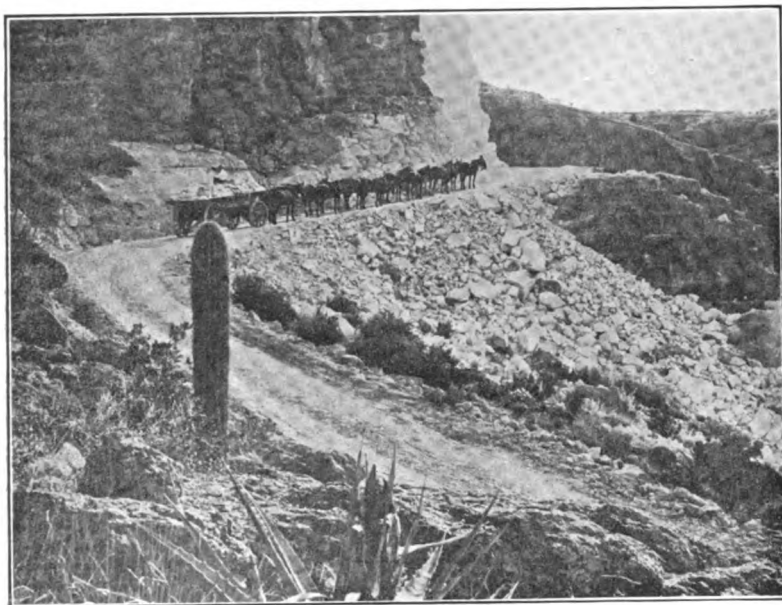
	Miles to	Total Miles	Out Return
Santa Fe	0.0	0.0	66.7
Agua Fria	5.0	5.0	61.7
La Bajada	16.2	21.2	45.5
Domingo	5.7	26.9	39.8
Algodones	14.3	41.2	25.5
Old Bernalillo	5.3	46.5	20.2
Bernalillo	2.3	48.8	17.9
Sandia	3.7	52.5	14.2
Alameda	6.2	58.7	8.0
Albuquerque	8.0	66.7	0.0

Albuquerque-McCarty, 82.3 Miles.

	Miles to	Total Miles	Out Return
Albuquerque	0.0	0.0	82.3



Sunset on the Columbia River, Near Trinidad, Washington—Photo by Great Northern Railway.



New Road Cut Through the Superstition Mountains of Arizona.

Atrisco	3.3	3.3	79.0
Laguna	45.0	48.3	34.0
Casa Blanca	6.7	55.0	27.3
Enchanted Mesa	10.7	65.7	16.6
McCarty	16.6	82.3	0.0

McCarty-Springerville, 112 Miles.

	Miles to	Total Miles	Out Return
McCarty	0.0	0.0	112.0
Nation's Ranch	75.5	75.5	36.5
Laguna Salina	12.5	88.0	24.0
Springerville, Ariz.	24.0	112.0	0.0

Springerville-Globe, 148 Miles.

	Miles to	Total Miles	Out Return
Springerville	0.0	0.0	148.0
Cooley's Ranch	42.0	42.0	106.0
White Mountain Reservation	19.0	61.0	87.0
Forage	42.0	103.0	45.0
Rice	22.5	125.5	22.5
Globe	22.5	148.0	0.0

Globe-Phoenix, 115 Miles.

	Miles to	Total Miles	Out Return
Globe	0.0	0.0	115.0
Livingston	23.5	23.5	91.5
Roosevelt	11.3	34.8	80.2
Goldfield	43.2	78.0	37.0
Mesa	21.0	99.0	16.0
Frankenburg	5.3	104.3	10.7
Tempe	1.2	105.5	9.5
Phoenix	9.5	115.0	0.0

ITINERARY NO. 208.

Salt Lake City-Seattle.

Night Stops—Salt Lake City, Utah; Malad City, Pocatello, Hailey, Boise and Weiser, Idaho; La Grande, Ore.; Walla Walla, North Yaki-

ma, Cle Elum and Seattle, Wash. Ten Days, 1001 Miles.

Salt Lake City-Malad City, 111.5 Miles.

	Miles to	Total Miles	Out Return
Salt Lake City	0.0	0.0	111.5
Bountiful	9.1	9.1	102.4
Centerville	2.2	11.3	100.2
Farmlington	7.7	19.0	92.5
Kaysville	2.1	21.1	90.4
Layton	2.5	23.6	87.9
Clearfield	4.7	28.3	83.2
Ogden	9.1	37.4	74.1
North Ogden	8.9	46.3	65.2
Willard	5.0	51.3	60.2
Bingham	9.4	60.7	50.8
Honeyville	9.3	70.0	41.5
Deweyville	4.3	74.3	37.2
Collinston	4.7	79.0	32.5
Fielding	4.0	83.0	28.5

Plymouth	6.0	89.0	22.5
Portage	7.5	96.5	15.0
Cherry Creek, Idaho	8.7	105.2	6.3
Malad City	6.3	111.5	0.0
Malad City-Pocatello, Miles.		62.5	

	Miles to	Total Miles	Out Return
Malad City	0.0	0.0	62.5
Arimo	29.0	29.0	33.5
McCammon	6.5	35.5	27.0
Onyx	7.0	42.5	20.0
Nikam	5.5	48.0	14.5
Port Neuf	5.5	53.5	9.0
Pocatello	9.0	62.5	0.0

Pocatello-Hailey, 140 Miles.

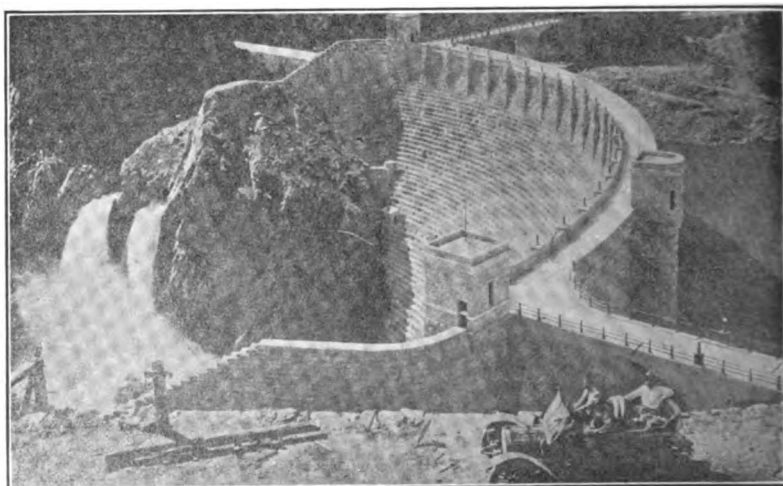
	Miles to	Total Miles	Out Return
Pocatello	0.0	0.0	140.0
Ross Fork	12.0	12.0	128.0
Gibson	6.0	18.0	122.0
Blackfoot	7.0	25.0	115.0
Taber	20.0	45.0	95.0
Cerro Grande	15.0	60.0	80.0
Powell	10.0	70.0	70.0
Arco	15.0	85.0	55.0
Martin	17.0	102.0	38.0
Muldoon	18.0	120.0	20.0
Hailey	20.0	140.0	0.0

Hailey-Boise, 112 Miles.

	Miles to	Total Miles	Out Return
Hailey	0.0	0.0	112.0
Blaine	16.0	16.0	96.0
Selby	7.0	23.0	89.0
Soldier	4.5	27.5	84.5
Corral	7.5	35.0	77.0
Little Camas	25.0	60.0	52.0
Thurman	24.0	84.0	28.0
Mayfield	10.0	94.0	18.0
Barber	12.0	106.0	6.0
Boise	6.0	112.0	0.0

Boise-Weiser, 83 Miles.

	Miles to	Total Miles	Out Return
Boise	0.0	0.0	83.0
Beatty	6.0	6.0	77.0
Sonna	8.0	14.0	69.0
Caldwell	12.0	26.0	57.0
Loralne	6.0	32.0	51.0
Jenness	5.0	37.0	46.0
Hanna	9.0	46.0	37.0
New Plymouth	12.0	58.0	25.0
Payette	9.0	67.0	16.0



Roosevelt Dam, the Splendid Government Irrigation Project in Arizona.



Mount Baker in the Canadian Rockies—Photo by Canadian Pacific.

Rebecca	11.0	78.0	5.0
Weiser	5.0	83.0	0.0

Weiser-La Grande, 106 Miles.

	Miles to	Total Miles	
	Out	Return	
Weiser	0.0	0.0	106.0
Feton	7.0	7.0	99.0
Blakes	8.0	15.0	91.0
Huntington, Ore.	3.0	18.0	88.0
Lime	4.0	22.0	84.0
Weatherby	6.0	28.0	78.0
Durkee	7.0	35.0	71.0
Pleasant Valley	12.0	47.0	59.0
Norton	8.0	55.0	51.0
Baker City	5.0	60.0	46.0
Haines	12.0	72.0	34.0
Hutchinson	5.0	77.0	29.0
North Powder	5.0	82.0	24.0
Telocaset	6.0	88.0	18.0
Union	7.0	95.0	11.0
La Grande	11.0	106.0	0.0

La Grande-Walla Walla, 68 Miles.

	Miles to	Total Miles	
	Out	Return	
La Grande	0.0	0.0	68.0
Allee	6.0	6.0	62.0
Elgin	13.0	19.0	49.0
Berkley	23.0	42.0	26.0
Blue Mountain	10.0	52.0	16.0
Milton	5.0	57.0	11.0
Spofford	3.0	60.0	8.0
State Line	3.0	63.0	5.0
Walla Walla, Wash.	5.0	68.0	0.0

Walla Walla-North Yakima, 132 Miles.

	Miles to	Total Miles	
	Out	Return	
Walla Walla	0.0	0.0	132.0
Sudbury	7.0	7.0	125.0
Divide	13.0	20.0	112.0
Walla Walla	9.0	29.0	103.0
Hover	4.0	33.0	99.0
Finley	4.0	37.0	95.0
Kennewick	8.0	45.0	87.0
Klona	18.0	63.0	69.0
Pronser	15.0	78.0	54.0
Grandview	13.0	91.0	41.0
Sunnyside	6.0	97.0	35.0
Zillah	14.0	111.0	21.0
Buena	4.0	115.0	17.0
Donald	5.0	120.0	12.0
Yakima	7.0	127.0	5.0
North Yakima	5.0	132.0	0.0

North Yakima-Cle Elum, 72 Miles.

	Miles to	Total Miles	
	Out	Return	
North Yakima	0.0	0.0	72.0
Pomona	9.0	9.0	63.0
Wenas	18.0	27.0	45.0
Ellensburg	14.0	41.0	31.0
Thorp	12.0	53.0	19.0
Horlick	7.0	60.0	12.0
Tennaway	5.0	65.0	7.0
South Cle Elum	4.0	69.0	3.0
Cle Elum	3.0	72.0	0.0

Cle Elum-Seattle, 114 Miles.

(For Routing Directions See Itinerary No. 203.)

ITINERARY NO. 209.**Vancouver-Sacramento.****Night Stops—Vancouver, B.**

C.; Seattle and Chehalis, Wash.; Portland, Salem, Cottage Grove, Riddle and Medford, Ore.; Sisson, Redding, Chico and Sacramento, Cal. Eleven Days, 1076.2 Miles.

Vancouver-Seattle, 138 Miles.

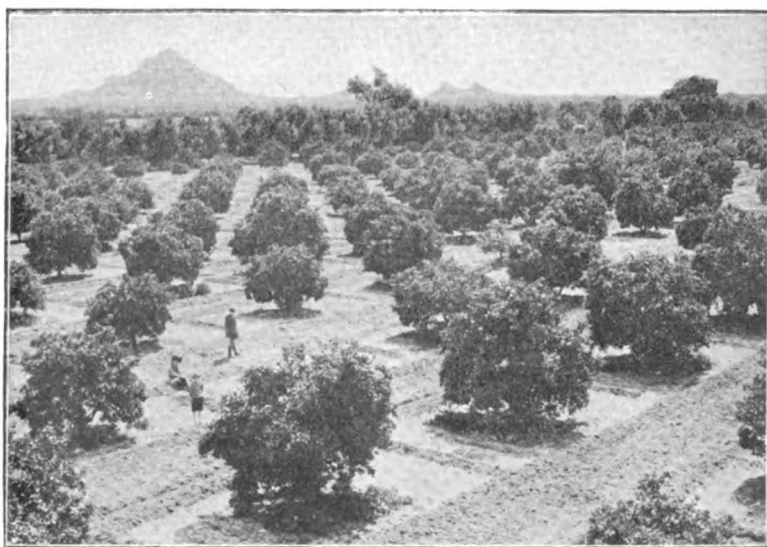
	Miles to	Total Miles	
	Out	Return	
Vancouver	0.0	0.0	138.0
New Westminster	8.0	8.0	130.0
Brownsville	3.0	11.0	127.0
Blaine, Wash.	15.0	26.0	112.0
Custer	8.0	34.0	104.0
Barndale	5.0	39.0	99.0
Bellingham	10.0	49.0	89.0
Bow	13.0	62.0	76.0
Mt. Vernon	10.0	72.0	66.0
Conway	6.0	78.0	60.0
English	20.0	98.0	40.0
Shohomish	15.0	113.0	25.0
Kenmore	15.0	128.0	10.0
Seattle	10.0	138.0	0.0

Seattle-Chehalis, 131 Miles.

	Miles to	Total Miles	
	Out	Return	
Seattle	0.0	0.0	131.0
Christopher	32.0	32.0	99.0
Tacoma	8.0	40.0	91.0
South Tacoma	11.0	51.0	80.0
Rainier	24.0	75.0	56.0
Olympia	21.0	96.0	35.0
Tenino	15.0	111.0	20.0
Centralia	16.0	127.0	4.0
Chehalis	4.0	131.0	0.0

Chehalis-Portland, 100.5 Miles.

	Miles to	Total Miles	
	Out	Return	
Chehalis	0.0	0.0	100.5
Cowlitz	18.2	18.2	82.3
Toledo	1.9	20.1	80.4
Castle Rock	16.0	36.1	64.4
Lexington	8.9	45.0	55.5
Kelso	1.5	46.5	54.0
Carrollton	7.0	53.5	47.0
Kalama	5.5	59.0	41.5



Orange Groves at the Foot of the Mountain, Typical of Southern California and Arizona.

Woodlawn Ferry	10.1	69.1	31.4
La Centre	5.6	74.7	25.8
Vancouver	18.4	93.1	7.4
Portland, Ore.	7.4	100.5	0.0

Portland-Salem, 94 Miles.

	Miles to	Total Miles	Out Return
Portland	0.0	0.0	94.0
Oregon City	19.0	19.0	75.0
Salem	75.0	94.0	0.0

Salem-Cottage Grove, 99 Miles.

	Miles to	Total Miles	Out Return
Salem	0.0	0.0	99.0
Jefferson	18.8	18.8	80.2
Albany	9.2	28.0	71.0
Hamsburg	30.8	58.8	40.2
Junction City	4.7	63.5	35.5
Eugene	13.5	77.0	22.0
Goshen	6.9	83.9	15.1
Cottage Grove	15.1	99.0	0.0

Cottage Grove-Riddle, 80.2 Miles.

	Miles to	Total Miles	Out Return
Cottage Grove	0.0	0.0	80.2

Siskiyou Pass	2.0	6.6	68.5
Coles	6.0	12.6	62.5
Hornbrook	11.9	24.5	50.6
Montague	15.1	39.6	35.5
Edgewood	21.5	61.1	14.0
Weed	4.1	65.2	9.9
Sisson	9.9	75.1	0.0

Sisson-Redding, 83.9 Miles.

	Miles to	Total Miles	Out Return
Sisson	0.0	0.0	83.9
Shasta Springs	8.6	8.6	75.3
Dunsmuir	3.3	11.9	72.0
Castle Brook	6.0	17.9	66.0
Castella	1.3	19.2	64.7
Southern	6.7	25.9	58.0
Kennett	43.0	68.9	15.0
Buckeye	10.1	79.0	4.9
Redding	4.9	83.9	0.0

Redding-Chico, 76.5 Miles.

	Miles to	Total Miles	Out Return
Redding	0.0	0.0	76.5
Anderson	11.8	11.8	64.7
Cottonwood	5.7	17.5	59.0
Red Bluff	16.4	33.9	42.6
Proberta	7.4	41.3	35.2

geles, Cal. Four Days, 487.1 Miles.

San Francisco-Santa Cruz, 90.7 Miles.

	Miles to	Total Miles	Out Return
San Francisco	0.0	0.0	90.7
Colma	8.8	8.8	81.9
South San Francisco	4.0	12.8	77.9
San Bruno	3.2	16.0	74.7
Holcoff	1.5	17.5	73.2
Millbrae	1.1	18.6	72.1
Burlingame	2.2	20.8	69.9
San Mateo	2.2	23.0	67.7
Belmont	4.0	27.0	63.7
San Carlos	1.1	28.1	62.6
Redwood	1.5	29.6	61.1
Palo Alto	5.4	35.0	55.7
Mayfield	1.6	36.6	54.1
Santa Clara	13.5	50.1	40.6
Santa Jose	3.9	54.0	36.7
Buena Vista	1.9	55.9	34.8
Moulton	2.5	58.4	32.3
Campbell	1.3	59.7	31.0



Indicating the Character of the Improved Road Construction in South California Amid the Orange Groves, with the Snow-Capped Mountains in the Distance.

Krewson	15.2	15.2	65.0
Yoncalles	18.8	34.0	46.2
Oakland	3.8	37.8	42.4
Southerlin	3.4	41.2	39.0
Roseburg	13.9	55.1	25.1
Dole	13.0	68.1	12.1
Myrtle Creek	5.1	73.2	7.0
Riddle	7.0	80.2	0.0

Riddle-Medford, 84 Miles.

	Miles to	Total Miles	Out Return
Riddle	0.0	0.0	84.0
Wolf Creek	28.3	28.3	55.7
Grant's Pass	20.2	48.5	35.5
Gold Hill	19.3	67.8	16.2
Tolo	4.7	72.5	11.5
Central Point	5.2	77.7	6.3
Medford	6.3	84.0	0.0

Medford-Sisson, 75.1 Miles.

	Miles to	Total Miles	Out Return
Medford	0.0	0.0	75.1
Ashland	2.8	2.8	72.3
Rawhide Toll Gate, Cal.	1.8	4.6	70.5

Vina	15.1	56.4	20.1
Chico	20.1	76.5	0.0

Chico-Sacramento, 114 Miles.

	Miles to	Total Miles	Out Return
Chico	0.0	0.0	114.0
Live Oaks	37.7	37.7	76.3
Marysville	12.8	50.5	63.5
Wheatland	16.9	67.4	46.6
Sheridan	4.4	71.8	42.2
Lincoln	10.6	82.4	31.6
Roseville	10.2	92.6	21.4
Ben All	16.2	108.8	5.2
Sacramento	5.2	114.0	0.0

Los Gatos	5.5	65.2	25.5
Alma	3.0	68.2	22.5
Soquel	18.5	86.7	4.0
Santa Cruz	4.0	90.7	0.0

Santa Cruz-Paso Robles, 149.1 Miles.

	Miles to	Total Miles	Out Return
Santa Cruz	0.0	0.0	149.1
Soquel	4.0	4.0	145.1
Aptos	3.6	7.6	141.5
Freedom	9.5	17.1	132.0
Watsonville	1.9	19.0	130.1
Moss Landing	9.6	28.6	120.5
Castroville	2.8	31.4	117.7
Salinas	8.7	40.1	109.0
Chauallan	10.9	51.0	98.1
Gonzales	5.9	56.9	92.2
Soledad	8.6	65.5	83.6
Greenfield	8.6	74.1	75.0
Jolon	21.6	95.7	53.4
Bradley	33.4	129.1	20.0
San Miguel	10.9	140.0	9.1
Paso Robles	9.1	149.1	0.0

ITINERARY NO. 210.**San Francisco to Los Angeles.**

Night Stops—San Francisco, Santa Cruz, Paso Robles, Santa Barbara and Los An-

**Paso Robles-Santa Barbara,
150.5 Miles.**

	Miles to	Total Miles
	Out	Return
Paso Robles	0.0	150.5
Templeton	5.7	144.8
Santa Margarita	14.3	130.5
San Luis Obispo	11.0	119.5
Edna	6.2	113.3
El Plamo	5.3	108.0
Arroyo Grande	3.5	104.5
Berros	4.3	100.2
Nipomo	4.7	95.5
Santa Maria	7.1	88.4

Garley	11.8	73.9	76.6
Slasquoc	1.5	75.4	75.1
Olivera	1.3	76.7	73.8
Foxen	7.6	84.3	66.2
Los Olivos	12.8	97.1	53.4
Santa Ines Mis-			
sion	5.8	102.9	47.6
Los Cruces	11.0	113.9	36.6
Gaviota	3.8	117.7	32.8
Lento	3.8	121.5	29.0
Tajiguas	3.5	125.0	25.5
Orella	3.0	128.0	22.5
Capitan	1.4	129.4	21.1
Naples	5.8	135.2	15.3
Goleta	8.4	143.6	6.9
Santa Barbara	6.9	150.5	0.0

**Santa Barbara-Los Angeles,
96.8 Miles.**

	Miles to	Total Miles
	Out	Return
Santa Barbara	0.0	96.8
Summerland	6.8	90.0
Carpinteria	5.0	85.0
Ventura	13.6	71.4
Montalvo	6.0	65.4
El Rio	2.5	62.9
Camarillo	9.1	53.8
Calabasas	25.0	28.8
Santa Monica	1.5	27.3
Hollywood	19.6	7.7
Los Angeles	7.7	0.0

VEEDOL CHART.

The Platt & Washburn Refining Company, 7 Broadway, New York City, manufacturer of Veedol motor oil, refined from Pennsylvania paraffine petroleum, has made an exhaustive study and experimentation of the lubrication requirements of internal combustion engines. The company has compiled a chart as the result of its scientific research, and a copy will be mailed free to owners and the trade. It contains lubrication information that will be of decided value to automobilists.

WOODS MOBILETTE.

The International Cycle-Car and Accessories Company, with executive offices at 1109 Security building, Chicago, has been organized for the general distribution of the cars and parts manufactured by the Woods Mobilette Company, Chicago.

The policy of the new company will be to give absolutely dependable service. Every dealer will be dealt with directly to the satisfaction of himself and the car manufacturer, insuring economy, speed and efficiency of the work.

WALLACE ABSORBERS.

The Bresler Wallace Sales Company, 1031 Dime Bank building, Detroit, is marketing the Wallace shock absorbers for

the model T Ford car. They replace the usual spring shackles and look like nothing so much as the logical spring hanger. The Wallace shock absorbers lie in direct line with the path of shock impulse and move with it. The maker points out that even the slightest shock is transmitted directly to the spiral springs, and that no part of it is taken up by friction in other moving parts. The Wallace device is moderately priced.

NATIONAL HOSE.

The Staybestos Manufacturing Company, Germantown, Penn., manufacturer of the well known S-M-C asbestos brake lining, is marketing the National radiator hose, which is constructed of the same high grade material and workmanship for which the products of this concern are noted. The hose comes in 50-foot lengths, but is supplied in multiples of five-foot lengths.

MOSLER SPARK PLUGS.

To obtain maximum efficiency from the motor it should be equipped with spark plugs, the points of which are properly located in the combustion chamber. A. R. Mosler & Co., New York City, maker of the well known Spit Fire spark plugs, is issuing a booklet containing much valuable information on ignition. Each standard make

of car is listed, and the proper type of plug to use with it is described and illustrated. The booklet will be mailed free upon request.

RAYBESTOS.

The Royal Equipment Company, 1378 Bostwick avenue, Bridgeport, Conn., is manufacturing the well known Raybestos brake lining, the friction material with the "Silver Edge". This lining is made in conventional widths and thicknesses and sold with a liberal guarantee. The company invites motorists, when in Bridgeport, to inspect its factory.

MOTOR TROUBLES.

The Vacuum Oil Company, Rochester, N. Y., has prepared a pamphlet on the construction, operation and lubrication of the automobile engine, in which are described motor troubles, their cause and remedy. The pamphlet will be mailed free upon request.

SE-MENT-OL.

The Northwestern Chemical Company, Marietta, O., is marketing Se-ment-ol, a chemical preparation for stopping leaks in the radiator. It comes in powder form and is poured into the radiator, and dissolving in the water, effectually stops leaks without injury to cooler.

TOURING ENGLAND AND THE CONTINENT.

Scenic Beauties and Historic Places of Interest Easily Reached by Motor Car, and Suggestions as to the Best Plans for Enjoying the Foreign Trip.

BY ALL means, the American tourist should "See America First", but this is no reason why the scenic beauties and historic wonders of the Old World should not be enjoyed. And the automobile has done its full share to make this possible, even for those of moderate means.

In other years it has been deemed advisable to include in the Annual Touring Number of The Automobile Journal detailed information as to shipping the car abroad, and much other data which can no longer be regarded as of especial value. Undoubtedly there are those who will prefer to take their own machines with them, but to those it is only necessary to say that the shipping companies will supply every requirement, even to procuring the driving licenses and all other papers needed.

The tourist of moderate means, however, will do quite as well to arrange with one of the numerous American concerns maintaining foreign offices, for the rental of a machine while abroad—or, more properly speaking, for the rental of machines, since it will be found advisable, if the stay is to be of some length and it is desired to visit a number of countries, to provide for several cars, as they are needed. Circumstances will enter very largely into the consideration of this phase of the situation.

In Great Britain, for instance, it would prove advantageous to make London or Liverpool the headquarters, leaving one point or the other for a tour of England, Scotland and Wales. The car may be rented in one city and left at the other, upon the completion of the tour. It probably will be necessary to rent a machine in England, and have it shipped across the Irish sea, if it is planned to visit the Emerald Isle, and, as will be indicated later, it is strongly recommended that this be included in the itinerary.

In many portions of France and Germany, as well as some of the other continental countries, it is possible to do considerable touring in taxicabs. The initial charge for a private taxicab in Paris is 85 centimes, as compared with 75 for the public cab. This permits

a drive of 1300 meters, and, thereafter, the charge is the same for both, 10 centimes for each 300 meters. A centime is three-fifths of a cent and a meter is 3281 feet, so that the initial charge is 17 cents for the first .8 mile and two cents for each .18 mile thereafter. It would be possible to visit the chateaux district from Paris at a taxicab charge of \$20, for instance.

It may also be suggested that it is possible to purchase a car abroad, and sell it upon returning to America, and in many instances it will be found that this method works out very favorably as compared with the expense and inconvenience of shipping one's own machine. Many Americans follow this plan.

Great Britain.

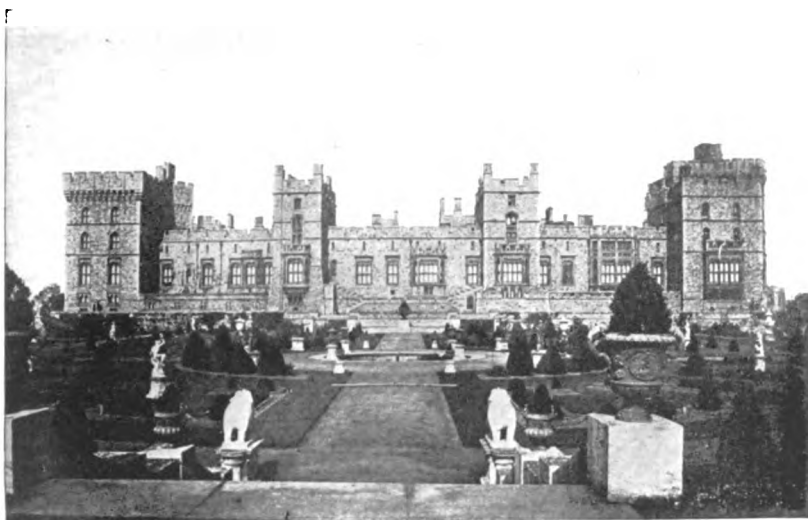
Because it is possible to cover so much ground in such a little time, Great Britain undoubtedly is the chief goal of American tourists. To many of them, it is still the "Mother Country", although their forebears may have come to the New World several generations since. The similarity of the customs and the identity of the language have done much to foster this condition. It may be added, as well, that the advent of the motor car has helped Americans to discover the many rich beauties of this island empire.

London, besides being the largest city in the world, possesses an untold wealth of historic interest. Trafalgar square is the starting point for all tourists, since it is the centre of the hotel district. The National gallery, with its superb collection of paintings, including the new

wing with its 2000 historical paintings of national celebrities from the days of the Plantagenets down through those of the Tudors, the Stuarts and the Guelphs, is on the north side of the square. Leading westward is Pall Mall, the centre of club land, and at the Green park end of the Mall is an irregular brick building, St. James' palace, where, although the British royal family no longer occupies it as a residence, is held the court of St. James. Marlborough house, now the town residence of Dowager Queen Alexandra, is separated from this building by a narrow car-



Hotel de Ville, or City Hall, Brussels, Belgium.



Windsor Castle, Home of the British Royal Family.

riage drive, and across Green park, is Buckingham palace, the London residence of King George.

Going down Victoria street, the campanile of Westminster Cathedral is seen at the left. This is held to be the most important addition to the architecture of London since Sir Christopher Wren built St. Paul's. At the top of Victoria street is Westminster Abbey, the first church of which name is said to have been erected on this spot by Sebert, the Anglo-Saxon king, on the site of the ancient temple to Apollo. At that time it was an island in the middle of the Thames. That church was destroyed by the Danes, and was rebuilt by Edgar, only to be destroyed by fire soon after its completion under Henry III. The present structure was built by Edward I, although his immediate successors added their portions, and is said to be one of the most perfect Gothic structures in existence.

On the opposite side of Parliament square is the Palace of Westminster, officially known as the Houses of Parliament, built in 1840-67. The original building on this site, which was the royal residence for hundreds of years, is said to have been occupied by King Canute, and is known to have been of a very ancient date. Opening out of Parliament square, through the short Parliament street, is Whitehall, where are now situated all the principal executive offices of the British government. Whitehall opens into Trafalgar square from the south. To the east leads the Strand, which joins Fleet street nearly a mile away, at Temple Bar, where the King is met by the Lord Mayor of London, upon each return to the city proper.

Space does not permit more than a mention of the other points of historic interest in this immediate vicinity, but they include the Bank of England, or the "Old Woman of Threadneedle Street", founded as a private institution in 1691, and in-

corporated as a state bank three years later; London bridge, and the Tower of London, with which few buildings in the world can compare for a history of tragedy and suffering.

England.

Assuming that London is made the starting point for a tour of England and Wales, it is probable that the short trip to Windsor will first engage the attention. Windsor is known as the royal borough, and for eight centuries it has been the private residence of the English sovereign. It is held to be the finest royal castle in Europe, and when the royal family is not present, it is open to tourists Tuesdays, Wednesday and Thursdays.

Oxford and Cambridge are too well known as university towns to need special comment, although it is interesting to recall that Oxford University is undoubtedly the oldest in the world. The exact date of its foundation is unknown, but it was incorporated in 1244. No American should leave England without a visit to Stratford-on-Avon, the home of William Shakespeare, and also of John Harvard, the founder of Harvard University.

England is rich in cathedrals and baronial castles dating back for centuries. Near Salisbury is Stonehenge, the mysterious Druidical remains, the exact meaning of which never has been learned. But no part of the country is so full of legendary record as Cornwall. A start for this district may be made from Bath, the oldest and best preserved of the Roman settlements in England. Plymouth was the last point touched by the Mayflower on its famous voyage to the new world. The Scilly Isles are held to be the much sung Hesperides of the Greek poets, and the ancient legendary kingdom of Lyonesse. It is a matter of historic record that the Phoenicians came to this portion of England to secure tin long before



One of the Typical Structures in the Chateaux District of France.



Aberfeldy Falls, Scotland.

offers mountain scenery quite as entrancing as the Alps, although not so lofty. The walls of Chester are hoary with age, and one should by no means miss the ancient timbered "Rows". Wrexham has a peculiar interest for Americans since Elihu Yale, founder of Yale University, lies buried there. Wrexham tower is one of the seven wonders of northern Wales, the other six being Snowdon, Pystyll Rhaiadr, St. Winifred's well, Overton church yard, Gresford bells and Llangollen bridge.

For such a small district no portion of England can please the tourist more than the lake district, the home of Wordsworth. The sylvan glades of Windermere are as different from "sweet" Ullswater as the mountain grandeur of the district around Derwentwater.

Scotland.

Scotland is the most romantic country in Europe, and, although the heroic warriors of the Middle Ages have passed away, the charm of those unforgettable days still hangs over the mountains and the burns. It was in the seventh century that Edwin built his burgh, or castle, around which has since been built



Harwarden Castle, Gladstone's Home.

Julius Caesar thought of crossing the channel on his mission of conquest.

Wales.

In the Wye valley of southern Wales are Hereford, the ancient capital of Pomonia, with its grave of St. Ethelbert; Simond's Yat, said to be the most beautiful spot in Britain; Monmouth and its old world air, the scene of Shakespeare's "King Lear"; Tintern Abbey, with its ivy-clad walls and luxuriant orchards, and Chepstow, with its giant fortress, built by Caesar on an edge of a precipice overlooking the river.

across the Forth bridge, in Dumferline, where Bruce's body is buried, is the home of Andrew Carnegie.

Robert Burns was born at Alloway, two miles from Ayr, near the "banks and braes of Bonnie Doon". From Ayr it is a quick run to Glasgow, the second city of Great Britain and the third in the empire. From Glasgow it is possible to make expeditions to the Firth of Clyde and Oban, the capital of the Highlands. Time also should be taken to visit the wonderful lochs of this region and the vale of Glencoe, where the rays of the sun are said to never penetrate.

Ireland.

There was a time when visitors to the Emerald Isle were wont to first make their wills and then commit themselves to the hands of Providence, so dangerous was the undertaking believed to be. But for a hundred years or more tourists have been singing their praises of this beautiful spot. It is only within the past few years that motoring has been considered at all possible. Great Britain has been expending large sums in road work, particularly in the north of Ireland, and motor touring is now coming to be very popular.

Americans generally have the first opportunity to land at Queens-

town, from which point it is only a short run to the Lakes of Killarney. Valencia Island is termed the "next county to America", and is rich in verdant tropical palms and fuchsia glades. Kenmare is a picturesque old town and one of the landmarks of the old Kerry coast road.

And the north of Ireland is quite as interesting, but in a somewhat different way. The mountains and

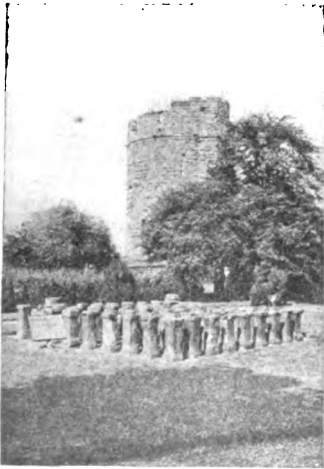
the wonderful city of Edinburgh. It is but a short drive to Abbotsford, the home of Sir Walter Scott; Dryburgh Abbey, where he is buried, and Melrose Abbey, where, under the altar, lies the great heart of King Robert the Bruce. And



Kenilworth Castle, Kenilworth, England.



Benny-Gloe Pass, Scotland.



Old Roman Baths at Chester.

great art centre, the capital of science; a city with magnificent buildings, enshrined in historic settings, with museums rich in priceless masterpieces, churches steeped in the romance of the Middle Ages, magnificent boulevards, theatres, operas, the finest shops, exquisitely dressed women, the most joyous pleasure loving populace, and the most brilliant capital in the world.

As brief as this description must be, it is impossible to omit reference to the environs of Paris, some of which have had a share no less important than the city itself in the making of world history. Versailles was the favorite residence of Louis XV, and the park was the scene of the famous, though no less scandalous, revels of the monarch and his courtiers. It is in this palace that the president of the French republic is

now elected by the two chambers sitting as one. Fontainebleau, on the other side of Paris, was erected by Francis I, and was the favorite residence of Napoleon. It was here that he kept Pope Pius VII a prisoner for two years, among the priceless art treasures stolen from Rome. The forest is the most beautiful in France and covers 42,500 acres.

France.

Paris is the one city which all Americans wish to visit when setting out on a continental tour. It is the oldest city of the northern empire, a

It is replete with picturesque glades and gorges, poetical ponds and wonderfully carved rocks, although it has been ravaged several times by fires.

Orleans and the chateaux district, in the valley of the Loire, is a section which is best visited by motor car for it is dotted with mediaeval towns and chateaux, the homes of many of the princely families of France. Orleans itself was made famous by Joan d'Arc. Vichy was a popular spa of the Roman days and is



Raglan Castle, Near Tintern.

still one of the most frequented watering spots in France. Nimes is the site of an interesting Roman theatre, not quite as large as the Colosseum at Rome, but in a much better state of preservation. Another amphitheatre is to be seen at Arles on the Rhone, an important station in the time of the Romans.

Fifty miles south of Avignon, where for 72 years a rival series of popes ruled in opposition to those at Rome, is Marseilles, the principal seaport of France. This city was originally founded in 600 by the Phoenicians and always has been a port of considerable importance. From Marseilles an excellent motor road follows the coast to Toulon, the chief naval port of France, and the Riviera, which, as every motorist knows, begins at the Islands of Hyeres and extends to the Italian



Conway Castle, in Wales.



Monastery La Grand Chartreuse.

frontier. The marvelous beauty of this district, with its splendid winter climate, its luxuriant foliage and the opulence of some of the better known resorts, is too well known to need extended comment.

Italy.

Crossing the Italian frontier from the Riviera, the first city of importance is Genoa, marvellously situated at the end of a wide gulf, the banks of which are



Coldes Aravies, in Haute Savoie.

crowned with olive clad hills. Its striking position, the beauty and number of its palaces, and the picturesque-ness of its streets make Genoa of especial interest. A little further along is its greatest rival, Pisa, once located on the shores of the Mediterranean, but now about eight miles inland. The leaning tower, or campanile, at the east end of the cathedral, is 179 feet high and 13 feet out of the perpendicular. Near Pisa is the royal summer residence of San Rossore, where the King of Italy breeds camels.

From this point the country is extremely uninteresting until the dome of St. Peter's betokens the approach to Rome. The Eternal City is undoubtedly the most absorbingly interesting city in the entire world. Unlike Thebes, Athens and Babylon, Rome has continued to be a supreme force in the culture of the world and a treasure house of the marvels of the ages. For 26 centuries, as republic, empire, chief city of the Christian religion and, finally, as the capital of united Italy, it has held its sway.

The Roman Forum, with its gigantic ruins, continues to tell its story of the grandeur of Imperial Rome. Here may be found traces of the temple of Castor and Pollux, the tomb of Romulus, the house of the Vestals, the palace of the Caesars and the famous Golden House of Nero. The scene of the martyrdom of the Christians was Nero's circus, now the site of St. Peter's, the largest church ever built.

Naples is the city of glorious sunshine, although the older portion is a knot of twisting streets, flights of stairways leading from one terrace to another, and narrow alleys. The new Naples is a city of broad streets, spacious squares and majestic hotels. From the heights of Camaldoli a wonderful view of the bay may be had. Other cities of prominence which should be visited are Messina, Florence, Turin and Venice, the last named being the "Queen of the Adriatic", once mistress of the commerce of the world. It is built on 146 islands and the most interesting portion is that along the banks of the Grand canal.

The Italian lakes are best visited from Milan. The enchanting scenery of these lakes has been told in

story and on canvas for centuries. Como, on the shores of the lake of that name, is considered by many to be the most beautiful spot in all Italy. A splendid motor road leads to Como, along the shores of the lake.

Switzerland.

Switzerland is known as the "Playground of Europe". Geneva is the largest town, and is situated on the southern shores of Lake Geneva. Its interest lies chiefly in its historical and literary associations and in the beauty of the surrounding country.

Chamonix is the most famous of the mountaineering sections, and is located at the foot of Mont Blanc. It is reached from Geneva, over a splendid motor road, through the French Alps. The ascent of the mountain takes two days, and a visit may be made to the Mer de Glace, the largest glacier in Europe.

Aix-les-Bains is termed the "Queen of Resorts and the Resort of Queens". It is on the border of the little Lake Bourget, and is reached over one of the prettiest of motor roads in the very heart of the wildest mountain region of the Haute Savoie. Other points of interest reached from Geneva are Fribourg and Berne.

From the latter city the tourist should visit the old world town of Thun, and Inter-laken, the jewel of the Oberland, near the green foothills of the giants of the Swiss Alps. By a general concession of opinion, Interlaken is at the head of the Swiss health resorts.

Berlin, the capital of the German empire, is no longer slighted by the tourist. The social and official life centres around Unter den Linden, which runs from the royal palace to the Bradenburger Tor. Other German cities which will attract and retain the attention are Hanover, with its fine old palaces; Hamburg, an important commercial centre; Munich, the Athens of Germany; Heidelberg and its universities; Bremen, Lelpsig, Dresden and Cologne.

A continental tour would hardly be complete without visiting Belgium, Holland, Norway and Sweden and Austria-Hungary, but space does not permit any detailed description of their many individual attractions to the motorist.



The Valley of Gavarnie, One of the Many Scenic Beauties of the Pyrene Mountains, Between France and Spain.

MOTOR POSSIBILITIES IN SOUTH AFRICA.

AFTER 22 weeks' absence, devoted to a study of motor conditions in South Africa, C. H. Dunlap, export manager of the Hupp Motor Car Company, Detroit, states that there is an excellent field for automobiles in that section. Due to the lack of transportation facilities other than railroads, the ox cart is still the chief vehicle in use, save for the motor car, which is making splendid headway. Commercial travellers, mine operators and Boer farmers are taking to the automobile.

The colonial government has appropriated \$5,000,000 for the construction of good roads and the improvement of existing ones, the bulk of which are very poor, so that in sections remote from the principal cities motorists are often forced to drive across the veldt. This plan, together with excellent agricultural prospects for this year, is bound to render South Africa a great motor market for 1915.

SPEDOLENE TRUCK STARS IN PARADE.

Alex Warrell Rides Through Worcester at Occasion of Inaugural Exercises.

One of the most striking features of the parade, held in conjunction with inauguration of the Worcester, Mass., White Way, illuminated by the new city lighting system, was the decorated truck of the Continental Asbestos Corporation of that city, manufacturer of asbestos lubricants and Spedolene. This lubricant is composed of the finest grades of mineral ingredients, so compounded as to make the product especially adapted to the needs of gears, transmissions, differentials and bearings. Spedolene, the maker states, positively eliminates gear noise and lubricates under any temperature.

Alex Warrell, the inventor of Spedolene and president of the company, is seen in the centre of the accompanying illustration. Frank L. Backus is vice president of the company, J. H. Savery treasurer and manager, Geo. H. Warrell secretary and

sales manager, Ed. J. Cross and John J. Pollard directors.

RUSSIA TO HOLD MOTOR CONTEST.

Winning Makes to Receive Huge Orders for Imperial Army.

In order to determine what type and make of automobile is best suited to the requirements of the Imperial Russian army, an endurance run will be held in August under highest auspices. The run will cover 2500 miles and the winning make will receive an order of 250 cars for the army, the second one for 150, the third for 100 and the fourth for 50.

TRAVELS 838 MILES FOR \$5.86.

Detroit Men Make Trip to Indianapolis and Return in Car-Nation.

As an indication of successful competition between automobile and railroad travel, with the success on the side of the motor car, it is worth while to note the experience of N. T. Brotherton and D. D. Thurber of Detroit, who went to Indianapolis sweepstakes races and back, covering 838 miles in a Car-Nation at a total cost of \$5.86.



Motor Truck of Continental Asbestos Corporation, Manufacturer of Spedolene, Which Was Among the Most Impressive in the Worcester Parade.

FASHIONS FOR THE SMART TOURIST.

Every Requirement of Motorists Has Been Anticipated by the Creators of Touring Apparel---Styles Are Simple, Pleasing and Practical.

AUTOMOBILING in inappropriate attire reduces the pleasure of motoring to something considerably less than what it might be. This holds true of driving and riding in all seasons, but most especially in summer, when the car owner starts on his or her vacation tour. The problem of just the right clothes is not half so simple as the tyro might think; in fact, it would be quite intricate, were it not for the fact that during recent years the manufacturers of apparel have devoted their loving attention to the needs of the motorists, more specifically the tourists, and by planning and experimenting have arrived at the present state, when the owner need only enter a large city store to find everything in the line of apparel which he requires.

There, if he reviews the offerings of Dame Fashion, he finds all his dreams of comfort realized, all his imaginings of stylish smartness combined with practical usefulness. And how could it be otherwise, after thousands and thousands of men in a score or more of industries have outdone themselves in the desire to serve him?

Most of this year's styles are, generally speaking, simple, but tasteful, light and easy, but intensely practical. This applies both to men's and women's clothing.

One of the most impressive coats offered to "Miladi" is a novelty Russian cape coat, Fig. 5, which is a two-color stripe pattern on a pale tan ground. This color scheme alone, striking and reserved at once, lends a smart air to the coat, which is increased by the clever cut. The wide English revers harmonizes remarkably well with the sweeping lines of a roadster or speed car and



Fig. 1—Long Poplin Folding Duster. Fig. 2—Khaki Duster with Leather Cuffs and Button for Cool Touring Regions.

no less with the greater luxury of the comfortable touring machine. Fancy velvet buttons and collar add to the quiet elegance of this piece of apparel. The waistline is accentuated by a short, neat belt, fastened in the back by four buttons. This coat has special attractions for the lady tourist, driver or passenger, who travels in rather cool, mountainous regions, although it is undoubtedly comfortable anywhere when driving at fair speed.

A simple, light and easy dust coat of smart cut is shown in Fig. 4.

This duster is made of a very good quality of gray mohair. The raglan sleeve ends in a turned-up cuff without buttons, which gives a very pretty effect and can also be slipped easily into the upper part of the driving gauntlet if one is worn. The plainness of the design is obviated by the shape of the large patch pockets and the belted back, which helps to bring out the figure without in the least degree discomforting the wearer. The coat is extremely lightweight, but most effective in preventing dust from reaching the ordinary apparel of the tourist.

Of course there are a number of mohair duster styles differing only in small details and in color. Blue and dark gray seem to be favorites this year, although the tan coat is naturally preferred by motorists intending to travel in hot or dusty regions. All of these dusters have the turned down collar, comfortable sleeves—kimono and raglan sleeves share the field—and black, self or pearl buttons, leaving but little range for variation in cut. One blue mohair duster, which is a fair representative of the average type, with cuffs and pockets, is illustrated in Fig. 6.

Dusters made of linen are coming into vogue, or rather would be if they had not come already. As a fine specimen of this type of coat, reference may be had to Fig. 14. This dust coat is what tailors abroad would term an intensely American style, being distinctive, practical and impressive at the same time. Certainly there are few shades more advantageous to the stylish looking lady motorist than is that of natural linen setting off the pure sheen of the pearl buttons which close the coat in front and adorn the large size patch pockets. The kimono sleeve and beltless back make this style as comfortable as it is attractive in appearance, and considering that dust does not show on natural linen, this assuredly is an ideal coat for the lady who goes on a long distance tour.

A natural linen motor coat of rather English cut is the model seen in Fig. 7. This coat adheres more closely to the body, being held together by the belted back, giving it a trim look. The raglan sleeve makes, of course, for comfort and renders this coat a desirable style for the lady who drives herself when touring. A feature of the sleeve is that it has no cuff, but a neat tab fastening, which holds it fairly tightly in place and permits the driving gauntlet to slip easily over the sleeve end. The self buttons, four of which show in front and one on each of the large pockets, are in keeping with the modest elegance of the style.

A clever little hat which might supplement the above-described cape coat in an admirable manner is the straw seen in Fig. 6. This model is a chartreuse hat, with a bronze wing fastened to one side, a feature which is in excellent harmony with automobile luxury and speed. The crown is of moire, the top of white silk, giving a pleasant and consonant color scheme equally favorable to blondes and brunettes.

Somewhat simpler in form, but fully as pretty is the white hemp braid hat, Fig. 3, the only ornament of which is a white fancy ostrich pom-pom. The hat is small and secure once it is in place. The lady with a dark coiffure could hardly find a headgear better suited to her personal color scheme.

In Fig. 7 a white silk tailored hat of faille is seen. The design is very simple, a stick-up being the only trimming, which gives the hat that air of style which a high plume would lend to it, yet without entailing the fragility of a feather.

To the lady tourist who does not care for a hat, the Balmacaan cap of black and white checked silk serge, Fig. 4, should have its attractions. The wide visor protects the eyes, as might the rim of a hat, but the cap is of much lighter weight than a hat and, when crowning a round or girlish face, is by all means the non plus ultra of motor headgear.

Goggles are of substantially the same design



Fig. 3—White Hemp Braid Hat with Fancy Ostrich Pom-pom. Fig. 4—High-Quality Gray Mohair Duster with Raglan Sleeve and Balmacaan Black and White Checked Cap; the Latter Is a Favorite This Year.



Fig. 5—Three-Color Russian Cape Coat with English Revers and Belted Back. Fig. 6—Blue Mohair Duster and Chartreuse Hat with Bronze Wing and Silk Top.



Fig. 7—Linen Coat with Raglan Sleeve and White Silk Tailored Hat.

as they were last year, save for one type which has small shields hinged to the glass adjacent to the points where the temples are secured to them, so as to protect the eyes from side draft.

The photographs above described were obtained by the courtesy of The Outlet Company, 176 Weybosset street, Providence, R. I.

As for men's apparel, no small selection is proffered to the automobilist. Dusters of various materials are preferred in general, principally because this kind of attire is the most comfortable, constituting, at the same time, a perfectly water and dust proof covering, provided the right material is

chosen for the coat. With regard to this point, it may be stated confidently that never before has such a variety of fabrics been used for men's dust coats as this season, and it will be hard to find a motorist whose requirements cannot be filled from the following array of motor wear, which is by no means an exhaustive one,

but illustrates merely a selection from a large line of goods.

A novelty which is bound to meet popular taste is the folding duster illustrated in Fig. 1. The material is poplin, a very thin and cool fabric, which looks like silk and is on a par with it as to ability of being condensed in a very small space. The cut is wide and comfortable and the general appearance of the coat is very simple; there are no buttons, but hooks and eyes are used instead. The back of the duster is plain, without belt, so as to offer no obstruction to rolling when the coat is being folded. In the latter state the duster forms a small bundle of hardly four inches diameter and not more than one foot length, as shown in the illustration, where the man holds a folded up coat by a handle sewn to its inside.

Another new style is the Irish linen duster, Fig. 10, which comes in white and also in black and white, with cuffs and pearl buttons. This material is light, but entirely dust and water proof, and hence very practical for the gentleman driver. The same style can be obtained in mohair, silk or gabardine.

Gray linen crash dusters have the advantage that they stand rough usage very well, and to this fact their growing popularity is due. Fig. 8 illustrates a dust coat of this class, being quite a simple cut, yet one which will please many motor enthusiasts with whom comfort and practical shape are prime considerations.

A comparison of the various dusters reveals a considerable similarity of design among them. In fact, all the variation comes in by way of belted or beltless backs, cuff or no-cuff sleeves, plain or patch pockets. The variety lies, as has already been remarked, in the choice of materials, which, however, determines not only finish and color, but also to a great extent, the lines in which the material falls, thus having a notable influence on the general effect.

In Fig. 9 a silk pongee duster for the man who knows styles is shown. This material is one of the finest available for motor dusters; still it is very serviceable and many men will not consider any other for the touring outfit. The coat here shown is cut with a belted back, giving a



Fig. 8—Gray Linen Crash Duster. Fig. 9—A Very Stylish 1914 Covering: Silk Pongee Duster with Belted Back. Fig. 10—Irish Linen Duster with Pearl Buttons, a Novelty Which Comes Also in Mohair, Silk or Gabardine.

relatively close fit, together with the comfort of a light cover.

A departure from the general design is illustrated in Fig. 11. The dust coat here shown is a double-breasted style, with pearl buttons. It is made of gray mohair and presents a very distinguished appearance, being especially suitable to men of years.

What is known as a Balmacaan coat of Palm Beach material and considered to be one of the foremost men's styles of the year, is shown in Fig. 13. This style includes the kimono sleeve with cuff strap, making for smart appearance, which is true also of the pearl buttons trimming the coat. This duster is a very light one and extremely desirable for southern touring.

For driving in regions where cool weather is the rule, a khaki duster with leather cuffs and collar is the equipment of the wise motorist. Fig. 2 shows this type of motor coat. It closes tightly around the neck and gives excellent protection to the arms. Bone buttons are used.

There is little change in driver's equipments. One suit, made of khaki material and cut with high collar, consisting of breeches and Norfolk coat, is seen in Fig. 12. Canvas leggings are quite in favor as supplements to the outfit, which is also used frequently by motorcyclists. Gauntlets with lisle ventilating back, which have been favorite summer wear for some time past, go very nicely with this sort of suit. This outfit may be obtained in olive, brown and mauve shades of khaki, and the coat comes in belt and beltless styles.

The principal novelty in headgear is the "Holtite" cap, made of mohair, silk or gabardine, which is made to fit closely to the head by an elastic which lines the material inside. This cap is shown in Fig. 1.

Some caps this year are fitted with oil-treated silk, which forms a lining impermeable to perspiration, and shielding the material of the cap proper.

Another innovation in men's hats is the silk model shown in Fig. 11. The hat is of ounce weight and made in skeleton finish, combining lightness with style in a way which should give satisfaction to the hardest to please of automobile tourists.

We are indebted to Brown-
ing, King & Co., 212 West-

minster street, Providence, R. I., for the facilities offered us in viewing and photographing men's motoring goods.

Of course the apparel here shown and described does not include all classes of automobile wear used by motorists. Only the principal styles which are in almost universal demand have been taken up. To mention others, there is the mackinaw, which is a favorite throughout the year with sportsmen driving their own roadsters or speedsters, and among college men the tennis jacket is quite widely used. This type of covering is also favored by the fair sex, and alike with some other perennial styles, is sure to present a fine appearance. Many girl drivers are fond of middie dresses for touring, and such generally prefer blue fabrics to white, which it is next to impossible to keep clean on an automobile tour. In respect to footwear, this year shows hardly any change over the past year or two; in fact, there are scarcely any exclusive motor styles worthy of special notice.



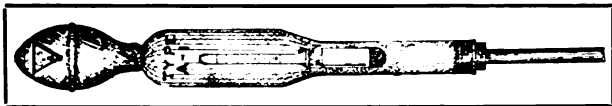
Fig. 14—Natural Linen Duster with All Buttons Made of Pearl.



Fig. 11—Double-Breasted Gray Mohair Duster and Skeleton Finish, Ounce Weight Silk Hat. Fig. 12—Driver's Suit of Khaki, Available in Several Shades. Fig. 13—Balmacaan Model of Motor Coat, of Palm Beach Fabric.

CARING FOR THE LEAD STORAGE BATTERY.

IN PREPARING the motor car for the tour the storage battery should not be overlooked, as it is important that it be in the best of condi-



Type of Hydrometer Syringe Utilized for Testing Electrolyte of Storage Batteries.

tion if efficiency is to be obtained from the lighting and motor starting equipment. Properly cared for, the lead storage battery gives good service and proper maintenance is obtained by adhering closely to the instructions of the maker.

Those who rely upon the service station should have the battery and all wiring connections examined, and the same holds true of the lighting dynamo. It is very probable that the generator will require lubrication or that some slight adjustment may be necessary, this, of course, depending upon the time the system has been in service.

The owner who cares for his battery will find explicit instructions in the book accompanying the lighting and starting equipment, and if the book be missing the maker of the battery will supply one free of charge upon the receipt of a letter or postal card.

If the car has been in service for some time it is suggested that the battery be removed from the container and the last-named member thoroughly cleaned. Ammonia will neutralize the effect of the acid used in the electrolyte, and the battery box should be wiped clean and dry. Clean all terminals and connections and coat with vaseline. Examine all wiring for loose connections and inspect each lead to make sure that the installation is not chafed. If a worn spot be found, either renew the wire or wrap it well with friction tape.

It is a good plan to carry extra bulbs in case one becomes burned out or damaged. Consult the instruction book or note the type of lamp used, and carry at least one extra bulb for the headlight and side and rear lights. A special container for storing the bulbs is not expensive and there is a variety of these marketed.

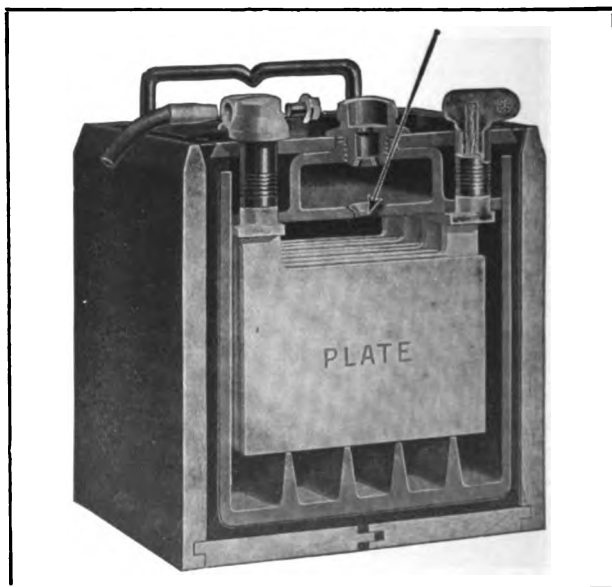
As the services of battery experts are obtainable in practically every city listed in the touring section, it will not be necessary to include a hydrometer or distilled water in the touring equipment. The owner is cautioned, however, to make sure that nothing but pure water is used to bring

the height of the electrolyte up to the predetermined level. Do not allow acid to be added by any garageman while en route and, if the battery gives trouble, have it inspected by an expert.

Those who desire to economize in preparing the machine for the tour should purchase a syringe hydrometer and distilled water for battery service. The hydrometer is easily used, as the electrolyte is drawn separately from each cell. The reading on the graduated stem of the hydrometer at the point where it emerges from the solution is the specific gravity of the electrolyte. After the reading the fluid is returned to the cell.

If the cells are in good condition the gravity will test about the same or within 25 points of each other. Gravity below 1.200 indicates that the battery is less than half charged and it should be used sparingly until the gravity is restored to at least 1.250. When it is below 1.150 it indicates a completely discharged condition and should be given a full charge. The gravity should be between 1.275 and 1.300 when the cells are fully charged.

If the battery fails to hold a charge, it is best to take it to the service station, where it generally can be restored to an efficient condition by a long,



Showing Construction of Conventional Type of Lead Storage Battery—The Arrow Indicates Proper Level of Electrolyte.

slow charge; but this cannot be done overnight, as it may require considerable time, depending upon the condition of the cells.

PREPARING THE CAR FOR THE TOUR.

Components Requiring Attention and Suggestions for Completing the Work--- Steering Gear and Brakes Should Be in Perfect Condition.

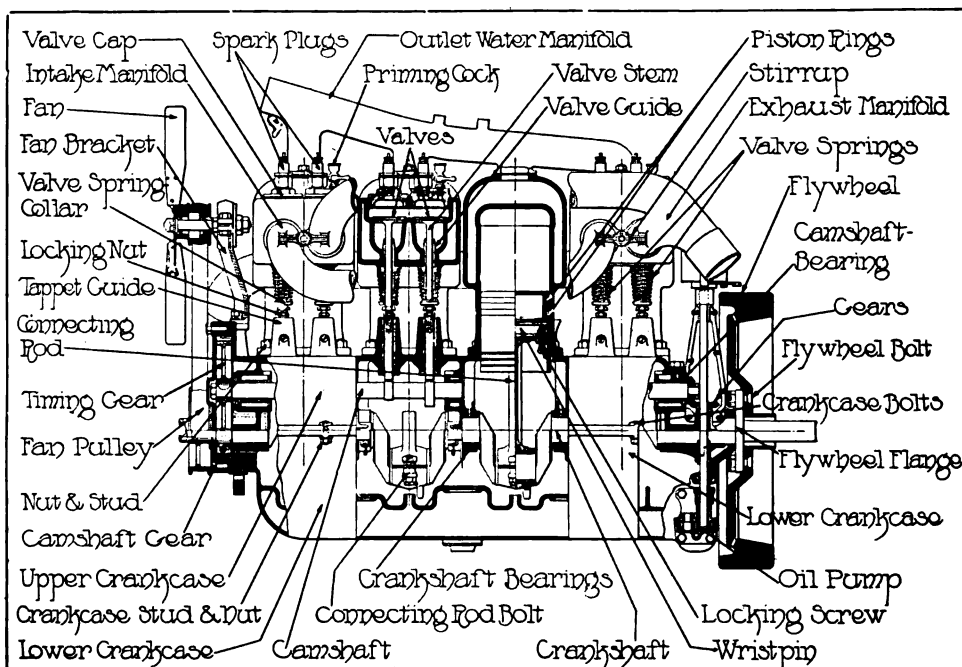
NOTHING detracts so much from the pleasures of touring as to experience trouble on the road. Frequently the tourist meets with mishaps through lack of attention to small details and invariably the trouble develops in the most undesirable locality and where the services of the expert repairman are not easily obtained. It follows, therefore, that the owner must take every precaution to insure proper operation of each and every component.

Regardless of whether the tour is to take one over state highways or through rural districts, the car should be placed in the best possible condition, for it will be subjected to stresses not generally encountered in daily service or on week-end trips. It should be remembered that in driving over strange roads the use of the low gear and brakes will be more frequently resorted to than when the driver is familiar with each hole and gully, and that steep or long grades will test the efficiency of the motor.

The labor and expense involved in preparing the machine for the tour will depend on its age and condition. A practically new car may not need any other attention than the grinding in of the valves, the removing of carbon and a general inspection for loose nuts and bolts. On the other hand, an old machine may require a complete overhaul and the replacement of worn parts. It should be borne in mind that the motor car which appears satisfactory to the owner may develop weaknesses when subjected to the severe service de-

manded of it in the mountains, etc., and the inspection of all components should be very thorough. Avoid all makeshift repairs, for such may prove decidedly costly in the end. If you are not thoroughly familiar with the part, have the expert pass upon its condition.

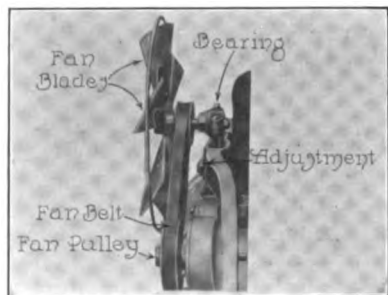
If the motor has been in service for some time, it should be given a thorough overhaul. It is best to begin the work by cleaning out the cooling system, by flushing it with clean water or utilizing a soda solution to displace the sedi-



Part Sectional View of Conventional Design of Motor with Parts Lettered to Simplify the Work of the Overhaul.

ment caused by using hard water. Some advocate cleaning a radiator by using water under pressure, but care must be taken to have all petcocks open. Old radiators should be handled very carefully, else damage is likely to result.

The use of the oxygen process makes easy the removal of carbon deposits, or the work may be done by hand, which generally requires taking off the cylinders. After the valves have been ground in and their seats tested, go over all motor bearings. As different bearing material is



Clean and Adjust Fan Bearings.

replacing the valves, check up the timing by the flywheel or the method recommended by the maker, correcting any faulty opening by adjusting the valve actuating mechanism. Check each valve separately and go over them a second time to make sure the timing is correct.

As carburetion and ignition are treated elsewhere in this issue, as are batteries, lighting systems and tires, these subjects may be dismissed from this discussion. Before leaving the motor, make sure that its supports are firmly anchored and that the radiator is properly mounted. Clean the lubricating system very thoroughly and refill the sump or reservoir with fresh oil. Inspect the pump and repack if necessary, clean and lubricate the fan bearings, and adjust the tension of the fan belt. All components lubricated by grease cups should be cleaned by passing a wire through their openings and the cups filled with fresh lubricant. Wipe the cups clean to prevent road dust from gathering.

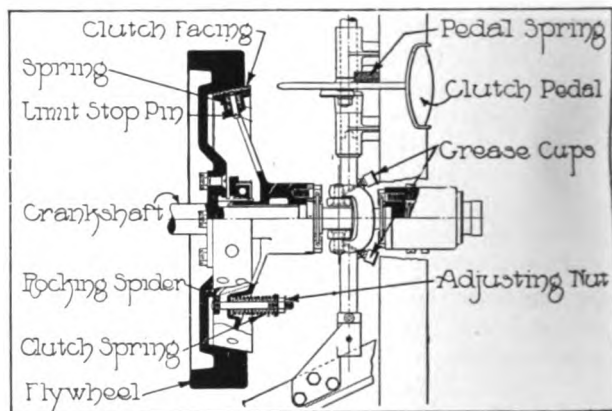
The type of clutch utilized will determine to a large extent the work of the overhaul, as that employed with the planetary transmission will require but little if any attention unless badly worn. The adjusting of the high-speed member, low and reverse, is easily made where bands are utilized. The lining of the cone clutch should be examined and, if it has been slipping and does not yield to the usual treatment, it is best to fit a new leather.

The multiple-disc type will require cleaning, which is easily accomplished by draining out the old oil and refilling with kerosene, engaging and disengaging the clutch several times; thereafter it should be re-

filled with the lubricant recommended by the maker. It is possible that the discs will require some slight adjustment.

Coming next to the transmission, remove the old lubricant and wash the gears and bearings with gasoline or kerosene. Drain off the fluid and wipe the parts dry, examining every crevice for foreign elements. With the gearset clean, the bearings can be inspected for play and the mesh of the gears tested. It may be possible that the shifting forks will require adjustment. Clean the tube through which the shifting rod has a bearing and lubricate. The gears should mesh easily and properly; if they do not, the fault should be corrected. Any component that binds or sticks, and which does not yield to the cleaning and lubricating treatment should be examined and the trouble remedied. If the gears, that is, their edges, are badly worn, it may be best to fit new ones.

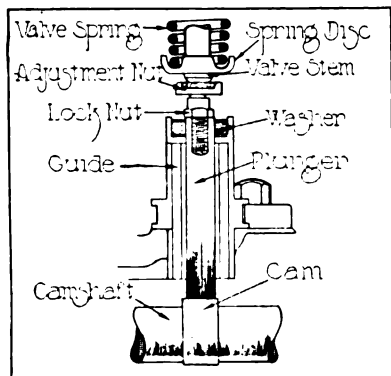
Universal joints are very important and



Components of Leather-Faced Cone Clutch Requiring Attention in the Overhaul.

should be cleaned and inspected. If too much lost motion is present, it may be cured by fitting bushings, but generally, if the parts are badly worn, it is cheaper to purchase and install a new joint. If packed in leather boots, renew the lubricant after the overhaul is completed.

The drive shaft and differential may not require any other attention than cleaning and the renewal of the lubricant, but it is possible that the position of the driving and driven gear may need correction and that the thrust bearings should be readjusted. The adjusting of the driving and driven gears of the differential requires skill and in each instance the instructions of the maker should be carefully followed. While working on the differential, it is an excellent plan to test the bearings for side play. Generally, means are provided for eliminating lost motion, and if

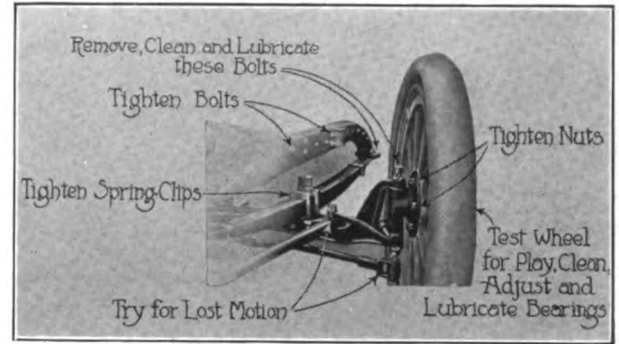


Valve Adjusting Mechanism.

the axle is of the floating type not much trouble should be experienced in adjusting the bearings. Care should be taken, however, to make the same number of turns to each bearing, else the position of the driven gear will be altered in respect to that of the pinion.

As the tour may take the owner over roads that will subject the wheels and bearings to severe stresses, it is important that they be in good condition. Since it will be necessary to displace the wheels to examine the brake linings, it will afford an opportunity to go over the bearings, keyways, locking mechanism, etc. Ball bearings should be packed with a non-acid grease and care should be exercised in the adjustment so that the bearings will not be too tight. Loose wheels and axle bearings are frequently the cause of faulty operation of brakes or undue friction.

Too much emphasis cannot be laid upon the importance of having the brakes and their link-



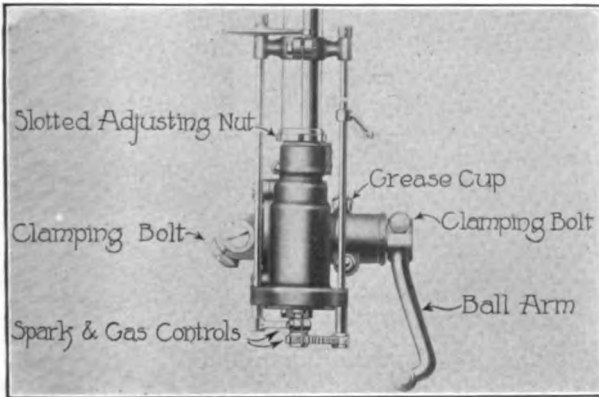
Important Members of the Front Axle Requiring Careful Attention.

tem, search for loose rivets in the housing and make sure that all nuts and bolts are tight.

Coming next to the springs, it will pay the owner of a used car to purchase a spring-spreading tool for opening the leaves of the springs. Displace all rust and foreign elements and lubricate the bearing surfaces with graphite and oil. Use as much of the dry, powdered graphite as possible. It will be surprising how much easier the car will ride after this treatment.

If the owner is to do nothing else, he should thoroughly overhaul the steering gear and its linkage, replacing any worn part by a new one and performing the work of adjustment very carefully. Provision is made in the modern steering gear for eliminating end play, as well as lost motion of the worm and gear.

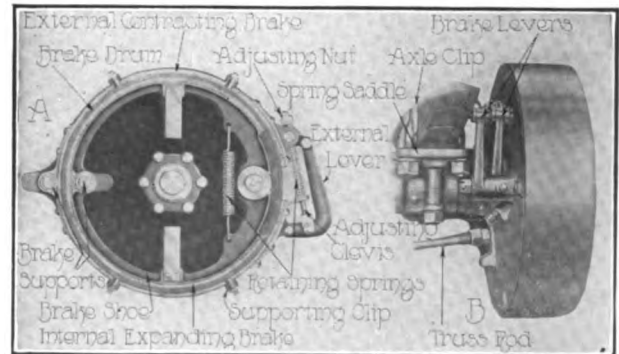
The drag link and tie rod connections are generally the cause of lost motion and this may be displaced by fitting new bushings and bolts. In overhauling the steering gear, the bracket supporting the column or tube should not be overlooked. The bearings of the front wheel will require cleaning and adjusting and in performing this work a worn bearing should not be mistaken for play of the wheel, as a worn spindle may be the cause of the undesirable lost motion.



The Inspection and Adjustment of the Steering Gear Is the Most Important Work of the Overhaul.

age in the very best of condition, as they will be severely tested on the tour. If the linings are worn, renew them. Clean and lubricate all parts subject to friction and test the rods and equalizers for binding. The springs employed to prevent the linings from contacting with the drums should be examined carefully. If they have lost their tension, stretch or renew them. It is surprising how much power is required to overcome the friction set up by the linings dragging.

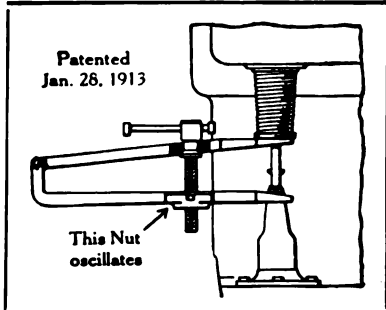
Torsion, radius and torque members are important factors in the drive of a machine and one cannot be too careful in giving these components the attention they deserve. If the rear axle be provided with a truss or strut rod, test these members for looseness, and if any play exists, remove same. They should be set up snug, not too tight, the locking members being set up hard and cotter pinned. Before leaving the rear sys-



Examine the Brake Linings and Renew if Worn.

TIME AND LABOR SAVING TOOLS.

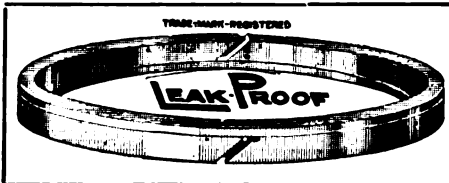
THE tools required for the overhaul of the car will depend upon the age of the machine, condition, etc. Generally the work may be ac-



C. P. Improved Valve Lifter.

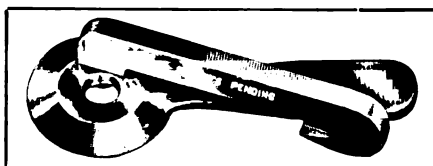
complished by supplementing those tools supplied by the car maker with a valve lifter, socket wrench set, S wrenches, etc. Supplies such as a valve-grinding compound, cotter pins, lock washers, gaskets, taper pins, nuts and bolts, etc., are inexpensive and are generally found in the garage where the owner attends to his own repairs. By picking up one or two tools at a time the equipment can be made complete enough to do ordinary work.

Lack of space prevents listing and describing other than general tools needed. In selecting a valve lifter, it is suggested that the owner purchase one that can be carried in the tool box on the tour, as it may be possible that a valve will



Leak-Proof Piston Ring.

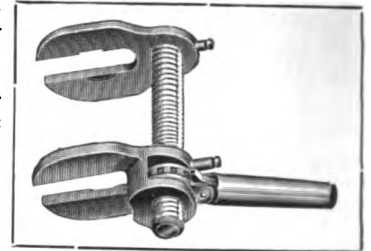
have to be removed. There is a wide variety of these devices, and one should be chosen that will fit the motor. Some valve lifters are universal; that is, are adaptable to practically any engine. Two practical designs are shown in the accompanying illustrations, the C. P. improved, made by the Clinton Machine Works, Clinton, Mass., and the Utility, marketed by the Morgan Manufacturing Company, Newport, R. I. Both these types can be locked, permitting the workman to use both hands to remove the retaining key of the valve spring.



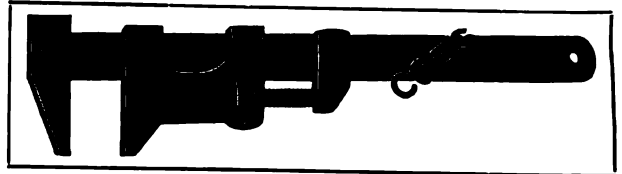
Morgan Utility Tool.

Company, Worcester, Mass., is a universal favorite with repair men, as it is constructed to withstand severe service. It is produced in varying lengths and is moderately priced.

Socket wrench sets are invaluable and, if included in the tool equipment for the tour, will make it possible to dispense with a number of individual wrenches, as well as to reach nuts and bolts not easily accessible with ordinary tools. The Frank Mossberg Company, Attleboro, Mass., markets a very practical equipment, which is shown in an accompanying illustration, and one of its features is the ratchet wrench. Double-end and pipe wrenches are included, also cotter pin extractor, etc. The Bay



Morgan Spring Opener.

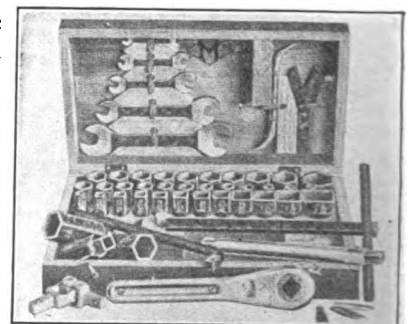


Coes All-Steel Monkey Wrench.

State Autokit, made in several sizes by George A. Cutter, Taunton, Mass., is another practical, complete and inexpensive socket set wrench.

If it be found in the overhaul that the piston rings are worn, and that new members are required, the Leak-Proof, made by the McQuay-Norris Manufacturing Company, St. Louis, Mo., will be found efficient. The practicability of the construction is shown in an accompanying illustration.

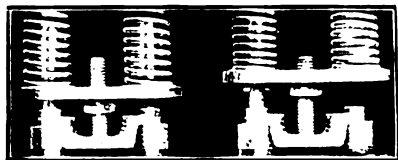
Assuming that the owner is to undertake his first complete overhaul, he will find a vise very useful, and the larger the opening of the jaws the better. Other practical tools are the breast drill, pliers, chisels, punches, files, hacksaws, etc.



Mossberg Wrench Set.

PERFECT VALVE LIFTER.

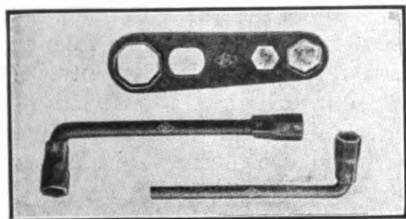
Winton L. Smith, 78 Clinton street, Newark, N. J., is market-



ing the Perfect valve-grinding set, which is made especially for the model T Ford motor. The outfit includes a valve spring lifter, valve-turning tool, wrench socket, abrasive, gauge and complete instructions. As shown in the illustration at the right, the springs are compressed by rotating a nut on a threaded bolt integral with the lifter. The equipment comes neatly packed and is moderately priced.

MOSSBERG WRENCHES.

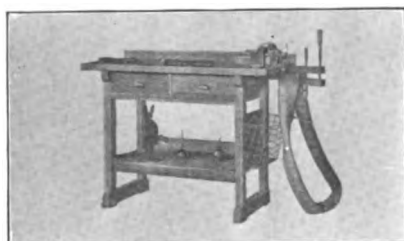
The Frank Mossberg Company, Attleboro, Mass., specialist in wrenches, is manufacturing a number of useful tools for the model T Ford car. Those shown herewith include single and double-end members and are employed for removing the cylinder head nuts, not easily accessible with ordinary tools. The single-cylinder wrench is known as the No. 620, the double as No. 625. Both wrenches have handles of such length as to provide a considerable leverage, and the openings are accurate, preventing damage to the nuts. The hub cap wrench is a particularly well de-



signed and constructed tool and like the wrenches is made of a high-grade material and yet is inexpensive. The Frank Mossberg Company issues a catalogue illustrating and describing its tools for Ford cars, which will be mailed free upon request.

GRAND RAPIDS BENCH.

While those who are handy with carpenter's tools can build a work bench for the private garage, those not proficient in wood working will be obliged to have the work done for hire or purchase a ready-made bench. The Grand Rapids Hand Screw Company, Grand Rapids, Mich., has brought out a work bench especially adapted to the private garage and for the needs of the

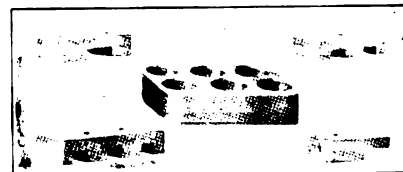


owner who does his own repairing. It is well constructed of wood and has drawers partitioned off for the storing of nuts, bolts, screws and small material. The top is of hard wood, is protected by galvanized iron and is perfectly level.

A vise is included in the equipment, it having a continuous screw. The bench is 48 inches long, 24 wide and 36 high, and is constructed to withstand hard service. The lower section is provided with a shelf having a back rail, and this arrangement makes it possible to store car parts during the overhaul. At one end of the bench is an extension for tube and tire repairing, and at the other is a wire basket for holding waste, sponges, rags, etc.

FIBRE CLEATS.

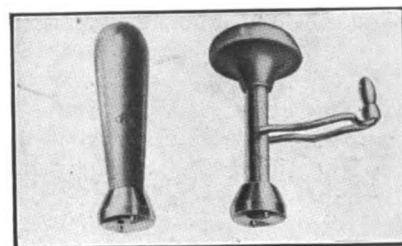
In renewing the wiring in the overhaul of the car, it is a good



plan to utilize fibre cleats, and these may be obtained from the American Vulcanized Fibre Company, Wilmington, Del., which concern produces a large variety of vulcanized fibre cleats, some of which are shown in an accompanying illustration. That shown in the centre is for retaining high-tension cables. The company produces cleats in shades to make them inconspicuous in places where appearance is considered.

MOSSBERG GRINDERS.

The Frank Mossberg Company, Attleboro, Mass., is marketing two types of valve grinders for the model T Ford motor. That shown at the left in the illustration is the No. 600 and is designed after the repairman's favorite method of grinding valves, that of utilizing a rolling motion between the flattened hands. The No. 605 grinder is constructed to permit of swinging a 90-degree circle and has pins which engage with recesses in the valve heads. The tools are constructed of high-grade material and are guaranteed in every particular.



PRACTICAL TIRE EQUIPMENT FOR TOURING.

Small Devices Which Create Comfort and Security When Travelling in the Motor Car—Little Care and Cash Save Much Trouble.

FULLY four-fifths of road troubles, untimely stops, discomfort, superfluous expense and what other ills are known to motorists are due to tires. Tourists have become accustomed to this condition and many consider that it is one we must bear up to—"grin and bear it". But this is quite untrue. Of all tire troubles that come up, from 80 to 90 per cent. are avoidable. How? asks Mr. Tyro.

The answer is simple enough. There is a reason for every mishap on the road, and in nine out of 10 cases, however technical its name may sound, the true reason of the disgusting situation is carelessness on the part of the car owner or driver, whoever takes care of the automobile. If a nail passes through the shoe and pierces the inner tube, causing a puncture, could not care in driving have avoided the nail from being picked up, or care in the garage removed it be-

when there is less than the specified amount of air in them to balance the outside impact than when the tires are properly inflated.

There is only one way of keeping your upkeep bill down to the minimum: Be careful. Inspect your tires regularly and, since in a way they do the roughest work of all parts on the car, more frequently than other parts. Pump them up to full pressure every morning and your tire troubles will be reduced by two-thirds. Depend on the tire gauge every time. After 100 miles stop to test the pressure, and if it is low, get it right. Every minute thus spent saves 15 in the long run. After getting to the garage in the evening, jack up the car and inspect the tires for nails and other possible causes of future trouble.

Indiscriminating economy is out of place in this field. If you are too frugal to buy a tire

CORRECT INFLATION PRESSURES FOR VARIOUS TIRE SIZES.			RISE OF AIR PRESSURE IN TIRES DUE TO DRIVING HEAT.		
Diameter, Inches	Max. Weight Per Wheel	Pressure in Tire	Pressure When Cold	Pressure When Warm	Increase Due to Tire Work
2.5	225	50	71.1	88.2	17.1
3	350	60	85.3	105.8	20.5
3.5	600	70	99.6	123.5	23.9
4	750	80	113.8	141.9	28.1
4.5	1000	90	128.0	158.6	30.6
5	1000	90	142.3	176.4	34.1

fore it entered deeply into the casing? Or, if the puncture was caused immediately upon striking the nail or stone, is this not a proof that the casing was thinner and more worn out than it should have been, and that a repair made with a little vulcanizer could have saved the loss of time and the expense of repair caused by the puncture? And if a puncture results in a blowout, does not this, too, prove lack of careful inspection on the driver's part? And so on, ad infinitum.

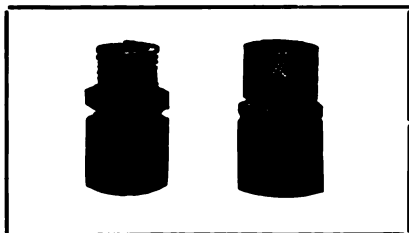
Whether you drive on a bad road strewn with sharp stones, trying only to get over it as quickly as possible without caring how, or whether you run your tires up against a curbstone, makes very little difference, except that in the latter case the process of destruction is somewhat swifter than in the former. Likewise, it is much the same if, with the tires otherwise equal, you drive them fully inflated over a bad road or at half or even less pressure over a good one, a much slighter unevenness putting your tires out of business

pump which makes inflation easy, you will pay four times its price in bills for inner tubes and repairs to casings; if you think it too much trouble to carry a small vulcanizer on the car, the repairman will thank you for enhancing his profits. The most experienced and most economical motorists are always on the look-out for new devices which will make their original equipment more efficient; these accessories save money. It is in a large measure due to modern accessories that automobiling is today in the reach of the million, while eight years ago it was the sport of a select few, of the wealthy.

Who would not laugh at a business man refusing today to use a typewriter, or at a farmer arguing that modern agricultural implements increase expenses without bringing a proportionately higher return? We know that they both simply cannot do without up-to-date equipment. The motorist who does things in a careless way is as foolish and improvident as either.

STEVENS TIRE VALVE.

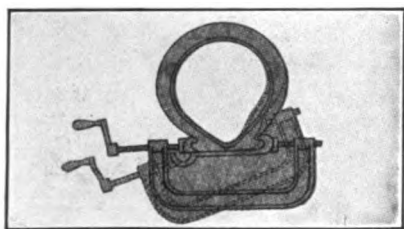
A tire valve consisting of but four parts, containing no spring



and constructed in such a way that inflating is made easy even for a child pumping with one hand, is made by the Stevens Manufacturing & Supply Company, Fisher building, Chicago. This valve consists of a hexagonal brass barrel with a thread cut on the small end, which fits any standard pump connection. The other end screws onto the valve stem and has a channel through the entire length of the barrel for the passage of air.

CALNAN TIRE REMOVER.

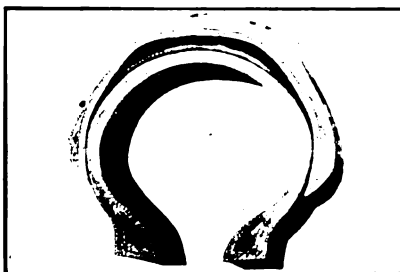
Many car owners have found themselves helpless in the face of a tire rusted on the rim, and it must be admitted that without the proper tools this situation is indeed troublesome. A very practical tire remover is made by James P. Calnan, West Union, Mass. This tool fits all sizes of tires because its grip may be modified by turning the crank-operated screw working in the nut formed in one end of the bracket shaped tool. By applying the tool to the casing as shown and compressing the bead by turning the handle, the shoe is wrested from the rim. The tool is operated from the



front of the wheel and locks automatically, permitting the operator to use both hands, if necessary, in turning the handle.

STANDARD PROTECTOR.

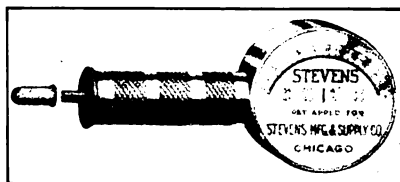
A tire protector which reinforces the walls of a casing and thereby shields the tube from nails, etc., is the Standard, made by the Goodyear Tire & Rubber Company, Akron, O. The device, which is built up of several layers of cotton fabric covered with a rubber layer much in the same way as a tire, is really a separate tread which is designed to be applied to the outside of a tire casing and after having been put in place it is held there by the inflation pressure in the inner tube. This,



of course, is a great advantage, as it does away with the need of fastening the protector to the tire. Furthermore, it is stated that this course is superior to the vulcanizing of an outer cover to the tire casing, as the heat of vulcanization at this point can hardly improve those qualities of the tire which make for efficient service. By using this type of protector the manufacturer claims that tires can be used for a considerable time after the original tread is worn out, when the sides of the rubber-covered fabric are still in good condition. In this way the tire bill is materially reduced and this is of special importance where large tires are used which otherwise are considered good for the scrap heap when the treads are worn out.

STEVENS TIRE GAUGE.

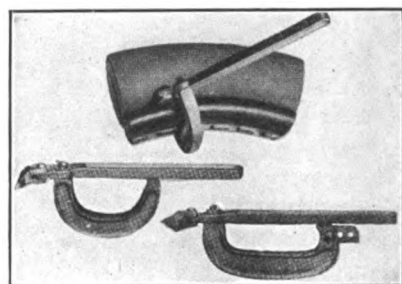
Although for more than a decade tire makers and dealers



have been emphatic in pointing out to the user the necessity of measuring the pressure inside the tube by means of gauges, there is still a great multitude kicking against the casing instead of gauging the air pressure according to the rules of the craft. Many motorists would buy testers and use them if they knew how many dollars are saved by such little instruments as the Stevens gauge, made by the Stevens Manufacturing & Supply Company, Fisher building, Chicago.

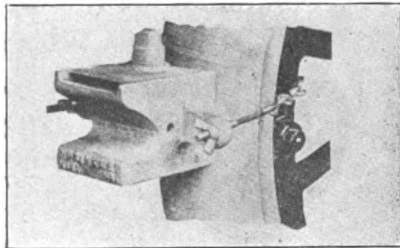
HOLDEN TIRE TOOLS.

The tire tool made by the Holden Manufacturing Company, St. Paul, Minn., comes in a standard form and a Ford model T type. The tool which is here illustrated locks by turning the handle outward just past dead centre; thus the bead is held inward, facilitating the removal of the tire from the rim if the latter is split crosswise. The standard tool is designed for tires from 3½ to five inches diameter, finished in aluminum and weighs two pounds. The Ford tool is made in two sizes.



NURINKLE VULCANIZER.

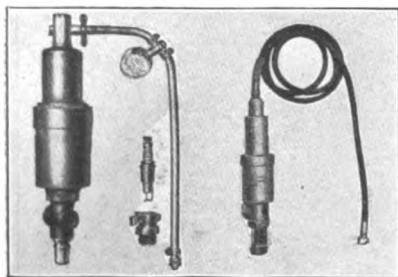
A compact, portable vulcanizer heated by gasoline is the



Nurinkle, made by R. E. Stevenson, Muncie, Ind. As the manufacturer states, the construction of the device is such and the instructions are so simple that improper use, that is to say, over-vulcanization, is rendered practically impossible. The amount of gasoline to be used is indicated by a cup made integral with the burner, and the correct quantity of fuel maintains the steam at the right heat.

BROWN IMPULSE PUMP.

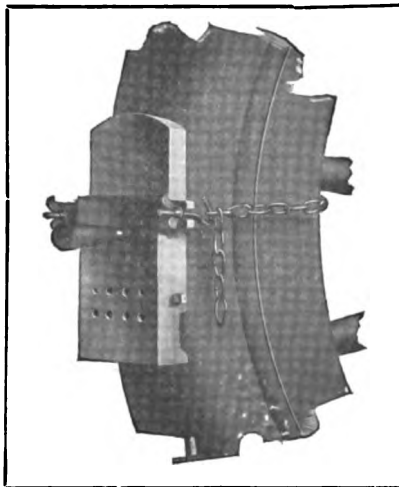
If tire inflating is no pleasure, automatic tire pumps are blessings. A very popular type is made by the Brown Company, 130 Bellevue avenue, Syracuse, N. Y. The pump being fitted into the spark plug hole after the plug has been removed, is operated by the suction and pressure in an engine cylinder. The pump is fitted with a spark plug, recording gauge and self-opening valve connection; it is made of gray iron, the same material as the cylinders, and equipped with 12



feet of hose. A smaller type is made for Ford cars and other low-powered automobiles. The pump, which cannot overheat, is of simple construction, its cylinder containing a piston which is reciprocated by the pressure inside the engine cylinder.

WIZARD VULCANIZER.

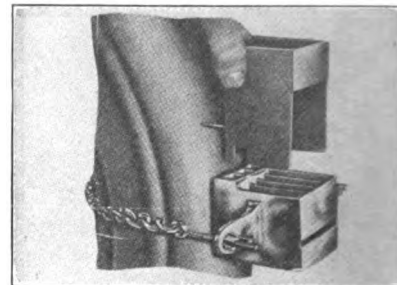
A portable vulcanizer for owner's garage or road repairs is the Wizard, made by the National Motor Supply Company, Cleveland, O. It is of the automatic steam type. The water is carried in a hollow body filled and sealed at the factory. In



the bottom of the vulcanizer, beneath the boiler, a fire box with asbestos packing is cast, which packing absorbs the fuel—gasoline or alcohol—a certain quantity of which is poured into the receptacle. Air being supplied by a number of draft holes in the chamber, the fuel absorbed by the packing burns with a blue, smokeless flame. The temperature is automatically controlled so that the device, once lighted, requires no further attention. The face of the vulcanizer is six inches long and three inches wide and curved to fit the face of the tire casing, while for inner tubes a flat plate is used.

POSITIVE VULCANIZER.

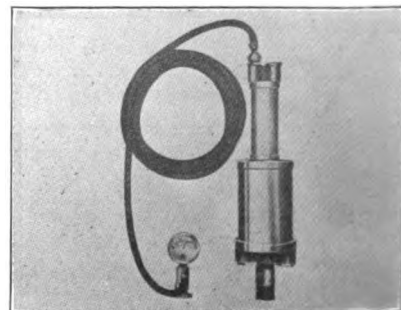
The Positive vulcanizer, made by the Positive Supply Com-



pany, Davenport, Ia., is so constructed that the heat produced by a flame of alcohol or gasoline in the fuel receptacle cannot injure the face of the tire tread. To gain this end a small compartment filled with water is interposed between the fuel container and the face plate contacting with the tire, so that the heat vaporizes the water.

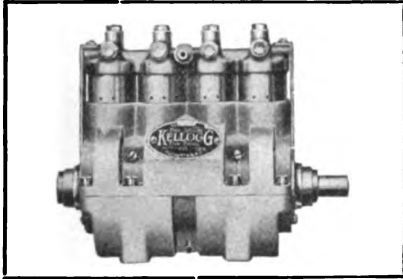
HANS TIRE PUMP.

One of the automatic tire pumps now on the market is made by the Hans Motor Equipment Company, La Crosse, Wis. It is made of brass and is designed to be fitted into the spark plug tap of the engine cylinder. The pump chamber proper has two check valves in it, drawing in pure air only and preventing any gases to enter from the engine. The tire pump is equipped with 12 feet of high grade flexible hose and a gauge for inflation pressure. The pump is said not to overheat.



KELLOGG TIRE PUMP.

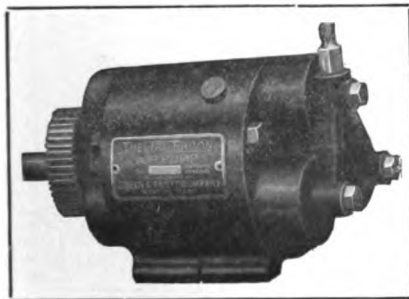
The Kellogg Manufacturing Company, Rochester, N. Y.,



manufactures a four-cylinder tire pump, cooled by air or water; the latter type is preferred for use in connection with air starting systems. There is a double check valve in each cylinder, and the pistons are operated by eccentric cams set at 90 degrees to each other on the same shaft; the material of the pistons is a special anti-friction metal, lubricated by splash and insured against leakage by a cup packing construction.

TRI-PHOON TIRE PUMP.

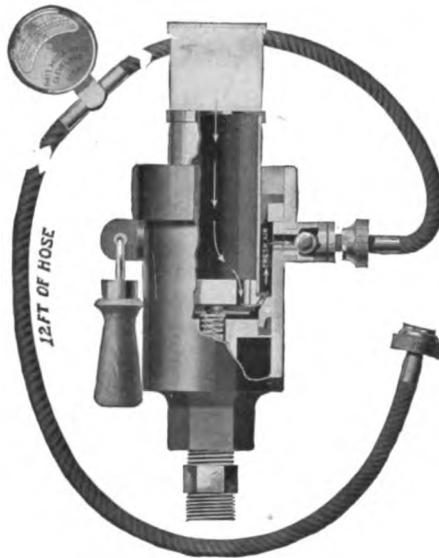
A three-cylinder tire pump, the Tri-Phoon, is sold by the Green & Swett Company, 737 Boylston street, Boston, Mass. Each pump cylinder contains a piston; the three pistons are worked by a common reciprocating cam driven by a gear from the crankshaft. The pistons are operated from the cam surface by roller bearings of the best grade of hardened and ground steel. Metal rings of special construction are used to



insure tightness around the piston. When driven at 800 rpm, the pump delivers a steady flow of air, the pressure of which, according to the statement of the maker, is equal to that of air emerging from a tank charged at 115 pounds per square inch. The drive of the pump may be taken off the crankshaft, camshaft, magneto or pump shaft.

NATIONAL TIRE PUMP.

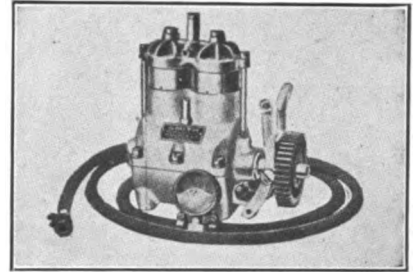
The National Telescope pump is manufactured by the National Motor Supply Company, Cleveland, O. This pump is of the spark plug type, that is, it is at-



tached to the engine of the car by unscrewing a spark plug and putting the pump, which is fitted with the proper connection, in place of the plug. Compression and suction inside the engine cylinder act to raise and lower the pump piston and as the latter reciprocates, the stem attached to its upper end and projecting through the casing of the pump moves up and down. The entire device is only five inches high, but it is claimed to be very efficient. The pump is equipped with the ordinary accessories and a wooden handle, for screwing it in place.

SMITH TIRE PUMP.

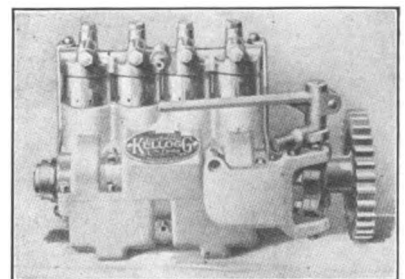
Smith Perfection tire pump, made by Smith Motor De-



vices Company, Dodgeville, N. Y., consists of two cylinders made of high-grade brass tubing tested to withstand a pressure of 400 pounds per square inch. The cylinder heads are made of special steam bronze so as to reduce heating to a minimum. The crankcases are of aluminum. An eccentric drives the bronze connecting rods.

KELLOGG SHIFT PUMP.

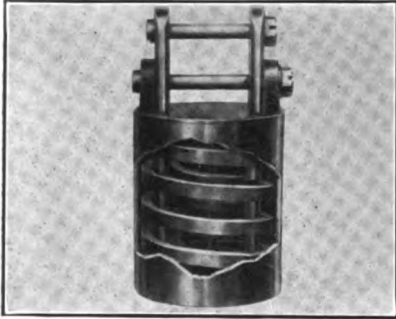
Among the different types of tire pumps made by the Kellogg Manufacturing Company, Rochester, N. Y., there is the design illustrated below. While constructed on the same principle as the type afore-described, this model differs from it in the method of the drive, which is obtained through the means of a spur gear which is in constant mesh with a pinion on a half-time shaft of the motor, and by moving the lever here shown, the collar carrying the spur gear is shifted to engage and drive the camshaft of the pump.



FOR EASY RIDING ON ALL ROADS.

HARTFORD SPRING.

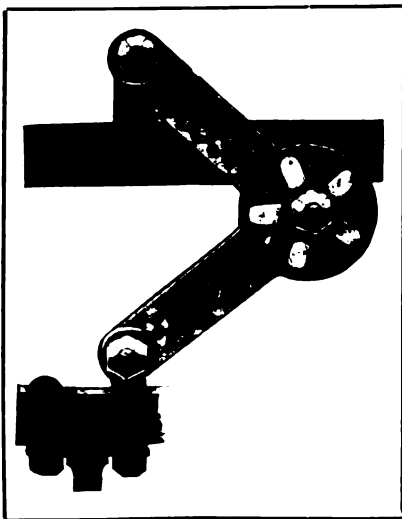
The cushion spring which is made by Hartford Suspension



Company, Jersey City, N. J., consists of two spiral springs arranged cylindrically within each other and attached to the rear shackles. While offering no resistance to normal spring action, they prevent extreme deflection of the springs upon the return to their average position.

TRUFFAULT-HARTFORD.

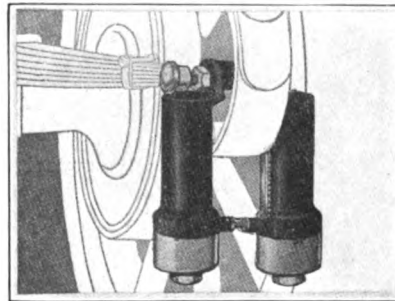
The shock absorber made by the Hartford Suspension Company, Jersey City, N. J., is too well known to require detailed description. The device operates on the principle of two pairs of faces secured to one inner



arm and a double outer arm respectively, which have inclined planes formed on them. These planes are brought into frictional engagement when the relative position of the arms and the discs to which they are attached is altered, and the resistance thereby obtained counteracts excessive spring movement.

J. H. S. ABSORBER.

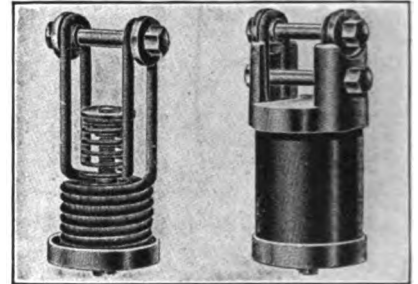
After having manufactured for years the well-known Sager equalizing springs, the J. H. Sager Company, Rochester, N. Y., is now marketing a shock absorber of the enclosed coil spring type, which is here illus-



trated. The twin cylinders of this device contain pistons which work in harmony with the coil springs in the casings so as to destroy the shocks caused by travelling over rough roads. The absorber is made specially substantial, very strong material being used and great exactness having been exercised in its construction. Both pistons work on a common wristpin, namely, the under spring shackle, while the upper shackle forms the connecting pin between the tops of the twin cylinders. The Sager company feels that this product is bound to give excellent service and for this reason has designed an unusually broad guarantee.

JOHNSON ABSORBER.

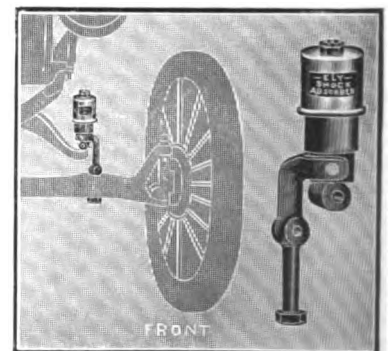
A two-spring coil shock absorber, the Johnson, is made by



the Triple Action Spring Company, 55 East 25th street, Chicago. This device consists of a strong outer coil spring, the ends of which are bent in loops secured to the upper spring shackle and an inner coil held at pressure between the top and bottom of the absorber casing.

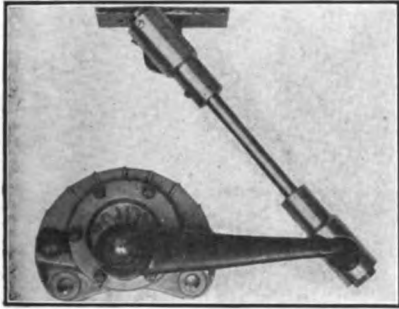
ELY DEVICE FOR FORDS.

A coil spring shock absorber of simple and rugged construction for Ford cars is sold by the Donnelly Motor Equipment Company, 1785 Broadway, New York City. The Ely device consists of a high-grade tempered spring, a carrying iron and a perch. The spring is inside of a brass cover made oil tight so as to render the use of lubricant possible. The guaranteed device can be fitted easily.



HERZ SHOCK ABSORBER.

Herz & Company, 245 West 55th street, New York City, is



manufacturing a novel type of shock absorber, operating on an original principle. An arm moving through a cast iron box filled with a specially prepared substance, by overcoming the resistance of the latter's viscosity, expends the energy of the shock imparted to the spring. The box is secured to chassis and connected to the spring.

COX SHOCK ABSORBER.

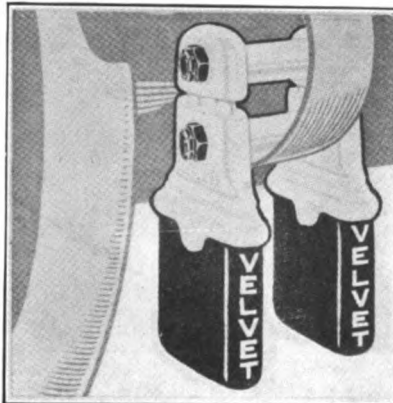
A shock absorber consisting of two twin cylinders is made by the Cox Brass Works, Albany, N. Y. The device here shown is attached with its bottom cover to the chassis, while the stem of a piston compressing a coil spring between the latter and the casing bottom is attached to the spring shackle. Deflection of the car spring



causes expansion or compression of the coil spring of the absorber. This device is easily installed and adjustable. For this latter purpose the cap of the casing is made to work on a thread and turning it down depresses the absorber piston and compresses the coil spring, so that the shock absorber is adjusted to take the load.

BLACKLEDGE ABSORBER.

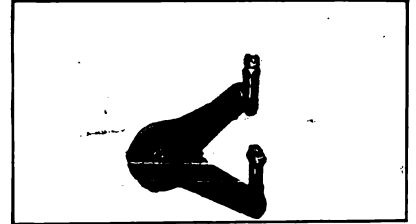
The Velvet shock absorber, made by the John Blackledge Manufacturing Company, Chicago, and sold by the Boice-Perrine Company, 601 Boylston street, Boston, consists of two



pairs of coil springs, each pair enclosed in a cover and surrounding steel studs. The upper spring ends bear against the cover holder, which is secured to one spring shackle, and the lower ends against the bottom plates fastened to the studs by nuts; the studs are connected to the top block or the device attached to the other shackle. The coil springs are so proportioned and tempered that they oppose no resistance to normal spring action, but if the springs are deflected beyond normal their rebound is checked by the action of the shock absorbers. The use of four small springs for each car spring, is understood to make for easy riding.

CONNECTICUT-FORD.

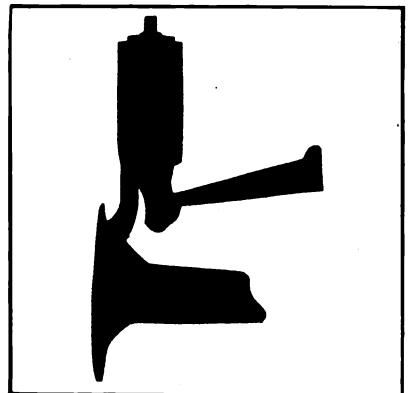
A set of three shock absorbers to be used on Ford cars is made



by the Connecticut Shock Absorber Company, Meriden, Conn. This device operates on the following principle: One arm is integral with the case containing a triangular set of springs and the other arm is attached to a three-faced cam which turns between the springs. The absorbers are so set that the springs are slightly deflected, which permits of unrestricted motion of the cam, but only in one direction.

J. M. SHOCK ABSORBER.

The J. M. Shock Absorber Company, 210 South 17th street, Philadelphia, makes the device here illustrated, in which compression of a coil spring by a piston is utilized to equalize the shocks created by the automobile striking road inequalities. This device has been on the market for years, so that no detailed description is required.



REVIEW OF MOTOR SIGNAL DEVICES.

WALTZ SEMAPHORE.

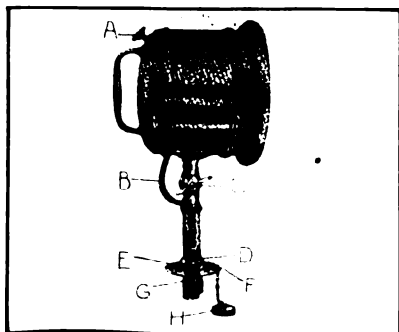
The Waltz automobile semaphore, made by the Irwin-Waltz Interests, City Hotel building,



Elwood City, Penn., is designed to indicate the direction taken by the car. It consists of three compartments, each of which contains an electric bulb enclosed in a case. The latter is covered with a celluloid plate bearing the license number in the shaft of a double-headed arrow set in an opaque background. Pushing proper buttons lights the compartments.

CELLO SEARCHLIGHT.

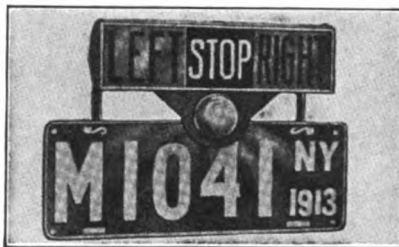
The Cello Wireless searchlight is made by the A. S. Campbell Manufacturing Company, 284 Commercial street, Boston, and in order to prevent short circuits the light is constructed without the use of wires. A high-grade reflector is included in its make-up and the device may be easily and quickly installed. A highly polished flush socket makes connection to the batteries and the push button A controls the lamp, giving a flash



when pressed down and steady light if given half a turn. B is the flexible cable and C the hinge joint. Nut D locks the deck swivel, F being the deck socket connecting with the main wiring below, while E is the bronze contact spring; G is a positive, self-cleaning contact.

STANDARD SIGNAL.

The signal device here shown, and manufactured by the Standard Signal Lamp Company, Sanford building, Bridgeport, Conn., is a neat, semi-cylindrical housing of three compartments, each of which is fitted with a tungsten bulb, con-



trolled separately or in combination. The "Left" compartment is red, the "Stop" black and the "Right" green. This makes reading of the indications very easy. Below the "Stop" plate there is a tail light, which also illuminates the number plate of the car. The plate is attached to the device by means of two brackets formed on the ends of the rods extending downward from the sign. The correct wiring, moreover, presents no difficulties, full information regarding this point being obtainable from maker when purchasing the outfit. The current required for illuminating the tail light and the three indicating bulbs may be taken from dry cells or storage batteries, or the electric equipment of the car.

UNIVERSAL TAIL LAMP.

To give ample illumination of the rear number plate without a glare making reading difficult



is the function of the product here illustrated of the Combination Tail Light Company, 954 Tremont street, Boston. This lamp is fitted with a special device throwing a soft, strong light over the entire surface of the number plate; it can be attached or detached in a very short time, so that a damaged bulb may easily be replaced.

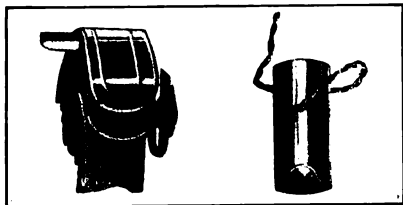
PASCO SIDE LIGHT.

An electric side light designed for cars not fitted with electrical equipment is sold by the Portland Auto Specialty Company, Portland, Me. This lamp is so installed that the arm holding it is turned upward, so that a maximum of illumination is obtained from the bulb. The light is projected by a parabolic reflector. All the wiring is concealed, as it is carried inside the substantial bracket.



LITTLE GIANT LAMP.

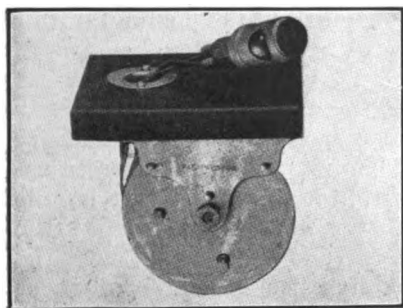
An ingenious device recently placed on the market by the



Harding Specialties Company, 755 Boylston street, Boston, and 1339 Michigan avenue, Chicago, is the magnetic trouble lamp styled Little Giant. The current sustaining the lamp magnetizes a coil strong enough to support the lamp by attraction on the surface of a steel or iron body, such as the mudguard in the illustration. This increases the usefulness of the lamp. The magnet is strong enough to lift ordinary tools.

SMITH DUPLEX LAMP.

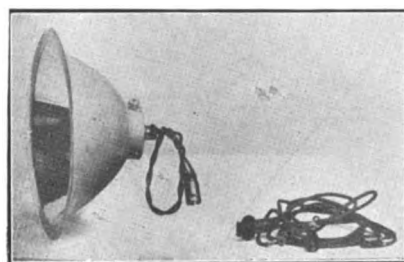
A trouble hunting lamp, attached to the dash instead of being carried in the tool box, is the Smith Duplex, made by J. W. Andrews & Company, Chicago. Its design makes it possible to use this lamp in place of the ordinary dash light. In order to give a pleasing appearance and also have the lamp always ready for using it around the car, the long, silk-wound cable, to the end of which the bulb is attached, is wound around a spool contained in the box, which is



mounted in front of the dash, the lamp itself being held in a socket and projecting through the dash, so that it may be pulled away from the spool at any moment. The equipment is sold with complete and lucid instructions as to mounting.

C-S FORD HEADLIGHTS.

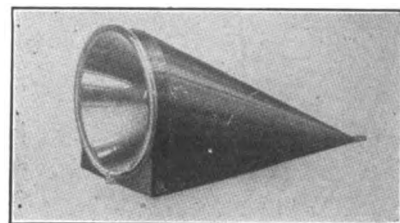
Remembering that the fly-wheel magneto of the Ford car produces an abundant amount of electricity and that many owners of model T Ford cars would be glad to use this surplus of energy for electric lights on their machines, the Culver-Stearns Manufacturing Company, Worcester, Mass., has placed on the market a simple outfit which makes it possible to



convert the lighting system of such cars to electricity without much work. The C-S patented lighting outfit consists of one pair of reflectors which are heavily silver plated, a pair of bulbs, Ediswan connectors, the necessary wiring, switch and whatever else is required to install the system on the car. Since the current is taken directly from the flywheel generator, the equipment may be put in place in a short time and without in any way disturbing the rest of the mechanism of the automobile. For easy removal the bulb is held by a patented device in the back of the reflector, so that, by loosening a knurled nut and rotating bulb holder slightly, a burned-out bulb may be quickly replaced.

J-M LOBSTER EYE.

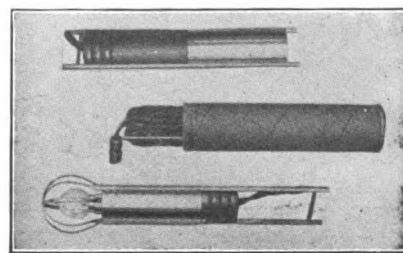
An unusual, but very practical, headlight design is manufac-



tured by the H. W. Johns-Manville Company, New York City, known as J-M Lobster Eye. It is attached to the top of the front mudguard in such a way that the vertex of the conical lamp container points to the rear of the car. The mouth of the cone contains the suitably shaped reflector which has a diameter of six inches and in the centre of which the bulb is located. It is made in two styles.

CUNO INSPECTION LAMP.

The Cuno Engineering Corporation, 80 South Vine street, Meriden, Conn., sells the Cuno inspection lamp, which has a black enamelled wooden handle with a special Ediswan socket. The 10-foot extension cord is attached to a hard rubber connector and the bulb is protected by a bronze spring guard projecting from the socket mounting; when not in use, it is shielded by a brass tube sliding over bulb and guard. Regulated by the tube, the light emitted by the bulb is concentrated or diffused. The wire cord is wound around a reel attached to the tube.



CLEANING AND ADJUSTING THE MAGNETO.

Outlining the Construction and Operation of Components, and Suggestions for Remedying Ignition Troubles—Value of Maintaining Proper Gap of Contact Points.

(By C. P. Shattuck.)

ONE of the most important factors to be considered in the preparation of the motor car for the tour is the ignition system. The magneto of the new car will not require any attention except lubrication and a general inspection of the plate, magnet and other screws to insure that they have not

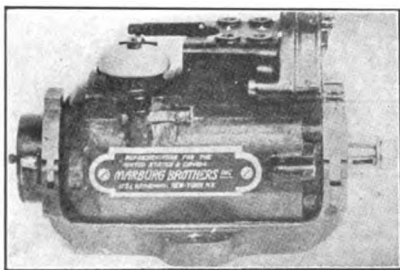


Fig. 1—Men Magneto.

worked loose through motor vibration.

The placing of the magneto in first-class condition can be done by the owner, although many motorists prefer to have the work performed at the service station or by an ignition expert. The average automobilist fears to touch the magneto, viewing it as a mysterious instrument, but it is simple and easily understood if one grasps the principles involved. This does not necessarily mean that one must know how to disassemble the instrument, for the motorist is advised against tampering. Dismantling the construction generally means that the magneto will have to be shipped to the factory for repairs. Aside from cleaning, adjusting and oiling, the instrument should be left alone.

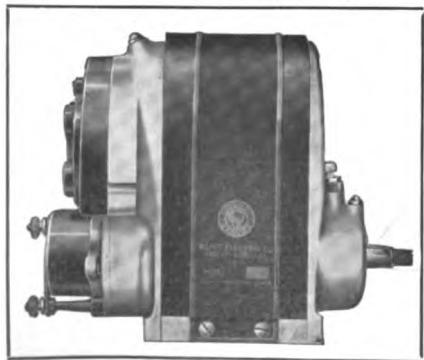


Fig. 2—Model R L. Remy Magneto.

Some owners, believing that they can improve the operation of the motor, attempt to change the timing. It should be borne in mind that the engineers of the factory have, after exhaustive tests, as-

certained the best timing for the magneto, and if the proper gaps of the contact points and plugs are maintained, there is no reason why the instrument should not be as efficient as when the car left the factory. It is the experience of magneto experts that much of the trouble credited to the instrument is due to other components of the ignition system, such as faulty wiring connections, and too large a gap at the points of the spark plug, etc.

Lack of space prevents taking up in detail the construction and operation of those magneto components which may be cared for by the motorist, but as the principles of the conventional types are similar these will be discussed.

Both the low-tension and true high-tension

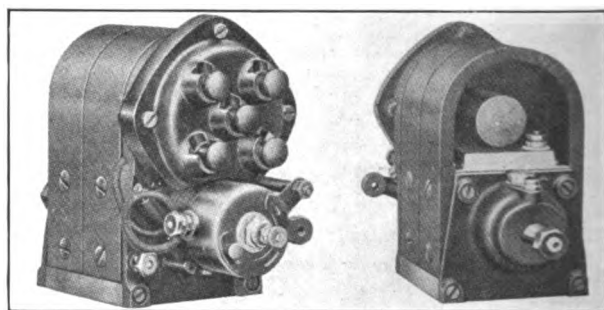


Fig. 3—Front and Rear View of Model A Splitdorf Magneto.

magnetos include means for interrupting or breaking the primary current. This is the timing of the spark, the break in the primary current supposedly taking place when the piston of the cylinder is in a position to obtain the maximum energy from the explosion.

The principle is similar to the commutator or timer utilized with the battery and coil system of ignition with which a large number of motorists are familiar. When the primary current is interrupted by the breaker mechanism, the electricity generated by the magneto is built up or transformed into a high-tension current, that is, one having sufficient energy to bridge the gap at the spark plug points.

The proper maintenance of the breaker or

contact points has been referred to, and at Figs. 4, 6, 8 and 14 are shown conventional designs, that at Fig. 6 depicting the components lettered. This breaker mechanism is utilized on the Bosch magneto. It will be noted that two contact points are provided, one a fixed and the other a movable member. Both are secured to and revolve with the armature shaft, and the construction is enclosed in what is termed the circuit breaker housing. The last named member is circular in shape and has two steel segments diametrically opposite each other.

How Break Is Caused.

It will be further noticed that the movable contact point is carried on an extension of the interrupter lever, and the latter also has a fibre block. This interrupter lever is pivotally mounted, and in the drawing the fibre block is shown just making contact with a segment. In this position the contact points are together, but upon the armature shaft being moved slightly the fibre

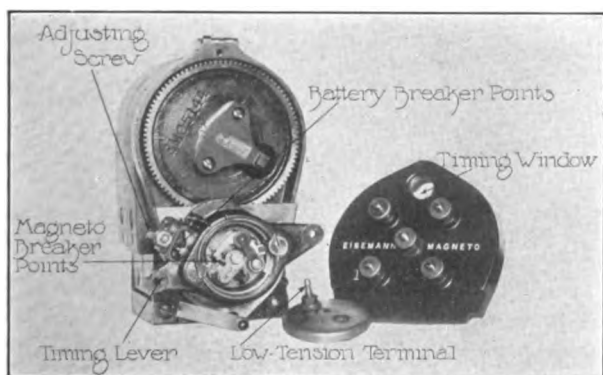


Fig. 4—Eisemann Type E M Magneto with Distributor and Circuit Breaker Covers Removed.

block will be moved inward, causing the contact points to separate or break. As two segments are provided, there are two breaks to each complete revolution of the armature shaft.

Types of Breakers.

The Eisemann type E M magneto, a true high-tension instrument, has a breaker box in which the timing lever is provided with two fibre cams and the interrupter lever a fibre block, as will be noted by reference to Fig. 4. In the Splitdorf type E U 4 true high-tension magneto, several views of which are shown, the breaker mechanism revolves with the armature shaft and the break of the contact points is accomplished by a roller coming in contact with two metal segments. The Splitdorf model A differs from the E U in that the circuit breaker mechanism does not revolve with the armature shaft and the break is secured by cams practically integral

with the armature shaft. The model B and other similar Splitdorf magnetos utilize a similar arrangement.

The breaker used in the Mea magneto is actuated by a fibre roller in connection with a cam disc, which is provided with two cams and located inside the breaker, being secured to the field structure. In revolving with the armature the roller presses against the spring-supported part of the breaker whenever it rolls over the two cams and in this manner a break of the primary current is obtained twice during each revolution of the armature. The construction of the Remy magneto breaker mechanism is simple. The breaker housing is termed a cam house and carries a pivotally mounted lever, also a fixed contact screw. The movement of the lever is obtained by a double-pointed cam on the armature shaft. The Simms magnetos employ a revolving breaker mechanism, the interruption of the primary current being by means of a fibre block contacting with segments in the breaker housing. The break of the primary current in the Connecticut magneto is accomplished by cams on the armature shaft extension, contacting with a roller and actuating a movable semi-circular lever. The National employs a cam construction, as does the Pittsfield. The K-W true high-tension magneto also utilizes a cam.

The armature of the magneto is driven at crankshaft speed with four-cylinder, four-cycle

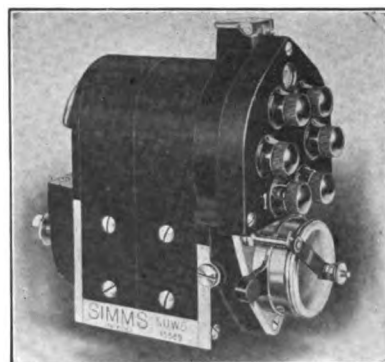


Fig. 5—Simms SUW 6 Magneto.

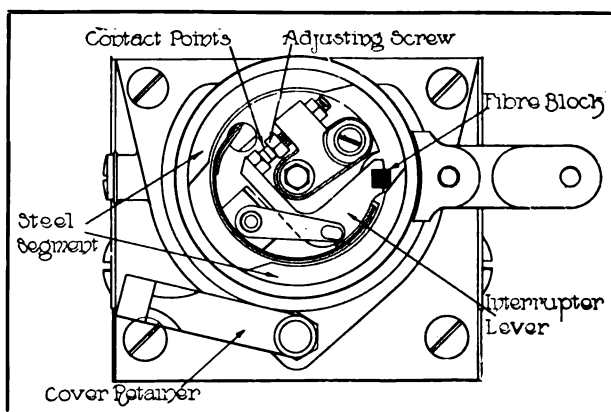


Fig. 6—Components of Conventional Type of Circuit Breaker Mechanism.



Fig. 7—Removing Splitdorf Distributor Cover.

will be easily understood if the operation of the four-cycle motor be considered.

The function of the distributor is to provide a passage for the high-tension current to the wires leading to the spark plugs. A distributor mechanism is shown at Fig. 4 and it will be seen that the distributor proper is provided with a brush through which the high-tension current flows. The distributor cover (shown displaced) has as many segments as there are cylinders, and as the distributor brush revolves, it makes contact in succession with each segment. This contact is made upon the break of the primary current or timing of the spark.

When the car is new the break of the points is correct. For example: In the Splitdorf it is 1-32 inch. After considerable service natural wear will increase the space affecting the operation of the magneto much in the same manner as too large a spark plug gap is responsible for ignition troubles experienced with batteries.

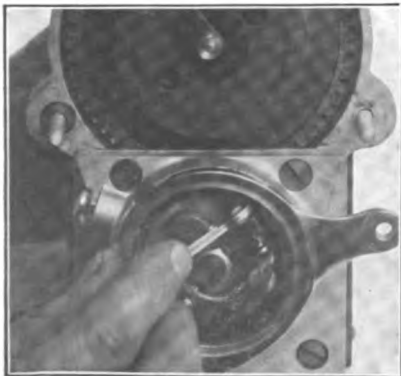


Fig. 8—How to Use Wrench on the Splitdorf.

motors, and at $1\frac{1}{2}$ times crank shaft speed for six-cylinder, four-cycle engines, but the distributor makes but one complete revolution to two of the armature. The reason for such an arrangement

in adjusting and cleaning the contact points, the breaker box illustrated being that utilized by the Splitdorf Electrical Company, maker of the Splitdorf magnetos and electrical apparatus.

To adjust the points, remove the breaker box by slipping the retaining spring to one side. It is shown removed at Fig. 10. Next crank the motor until the roller makes contact with a segment, fully separating the contact points. Then take the wrench and loosen the locking nut of the fixed platinum contact screw as indicated at Fig. 8. With this screw loosened the platinum screw may be moved in or out, as required, by using the wrench as shown at Fig. 10.

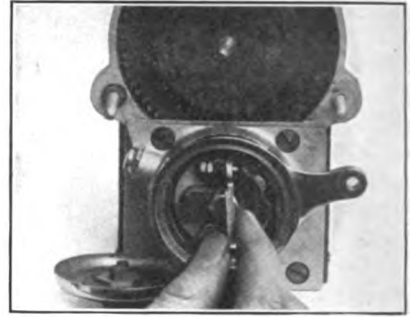


Fig. 10—Adjusting Splitdorf Contact Screw.



Fig. 9—Truing the Contact Points.

If the points are pitted they should be smoothed up, using a fine jeweller's file, as shown at Fig. 9. The smoothing of the points requires extreme caution. In the first place, care must be exercised to file evenly and not to take off more material on one point than the other. Secondly,

platinum is expensive and the replacement of spoiled points through carelessness is not desirable. By utilizing the file as shown at Fig. 9, or making a jig, true points can be obtained.

The testing of the gap is the next step. With the points fully separated, insert the gauge as indicated at Fig. 11. The blade should be a snug fit. If not, turn the adjusting screw until the desired gap is obtained, then set up the locking nut on the screw.

Do not exert undue pressure on the nut, as it is not necessary to lock it securely.

To clean the breaker mechanism, use a soft camel's hair



Fig. 11—Using Splitdorf Gauge.

brush dipped in gasoline. Waste or cloth is not recommended, as particles of lint may lodge on the working parts, affecting their operation. The brush is also suitable for cleaning the distributor.

In replacing the dust cap or circuit breaker cover and distributor, make sure that they are located correctly. They will fit easily and without forcing. Do not try to improve the tension of the brushes, as undue wear of the carbons, etc., will invariably result. In replacing the breaker box cover spring, make sure that it occupies its original position, especially if the instrument be of the dual type, one employing dry cells as a source of current for starting, etc.

If the magneto has been in service for some time, it is a good plan to go over all screws such as the magnet, plate, etc., to insure they are tight. It is important that the screws securing the magnets to the pole pieces be tight, for with some types of magnetos loose magnets invite the en-

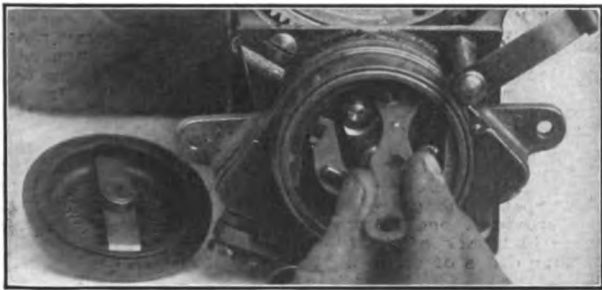


Fig. 12—Loosening Locking Nut on Bosch D U 4 Magneto.

trance of oil, which seriously affects the operation of the instrument.

Relative to lubrication, it is best to comply with the instructions of the maker. Do not over lubricate, nor use oil in the breaker box of magnetos utilizing fibre rollers, cams or blocks. In the overhaul of the power plant cover the magneto to exclude foreign elements, and if the instrument is so mounted that it is exposed to considerable road dust, fit a leather cover to it. The last named article is well worth the investment, as it will prevent the instrument being flooded with water by a careless washer.

All wires and connections should be carefully inspected, and if the leads are old or the insulation frayed, it is economy to purchase and fit new. With true high-tension magnetos it is important that the wire leading from the breaker box terminal to the switch, thence to ground, be in good condition. Fit new if the wire is old and solder all terminals.

When the magneto is of the dual type and the system includes a transformer coil, examine all connections to note if they are tight. If the

magneto is to be removed during the overhaul, tag each wire, unless in possession of the wiring diagram.

In timing or resetting the magneto the exact location of the piston for the firing position is determined by the engineers of the manufacturer of the car, and there are two methods, one by the position of the piston and the other by the fly-wheel or crank circle. In connecting the driving member to the armature shaft in the event, for example, of the magneto having been displaced from its base, the coupling is so made that the break and spark will take place as determined by



Fig. 13—Bosch Contact Points.

MAGNETO AND SPARK PLUG GAP ADJUSTMENT.

BOSCH.	NATIONAL.
Contact Points...1/64-inch	Contact Points...1/32-inch
Spark Plugs.....1/64-inch	Spark Plugs.....1/32-inch
CONNECTICUT.	PITTSFIELD.
Contact Points...File Gauge	Contact Points...1/64-inch
Spark Plugs....File Gauge	Spark Plugs.....1/64-inch
EISEMANN.	REMY.
Contact Points...1/64-inch	Contact Points...0.025-inch
Spark Plugs.....1/64-inch	Spark Plugs.....0.025-inch
K-W.	SIMMS.
Contact Points...1/64-inch	Contact Points...1/64-inch
Spark Plugs.....1/64-inch	Spark Plugs.....1/64-inch
MEA.	SPLITDORF.
Contact Points...1/64-inch	Contact Points...1/32-inch
Spark Plugs.....1/64-inch	Spark Plugs.....1/32-inch

the designer of the motor. The firing order and timing of magnetos of 1914 motor cars was published in the Feb. 25 issue of The Automobile Journal.

After replacing the magneto, do not attempt to start the motor until each wire is connected. It is equally important that a secondary cable be not removed from the distributor with the motor running or the safety spark gap trifled with. In replacing the secondary cables it should be borne

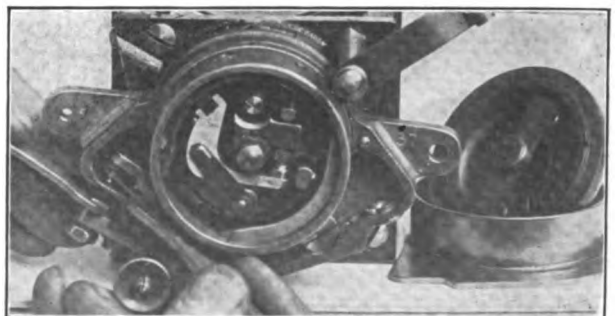


Fig. 14—Adjusting Contact Screw and Using Gauge on Bosch Z R 4 Magneto, Providing Dual Ignition.

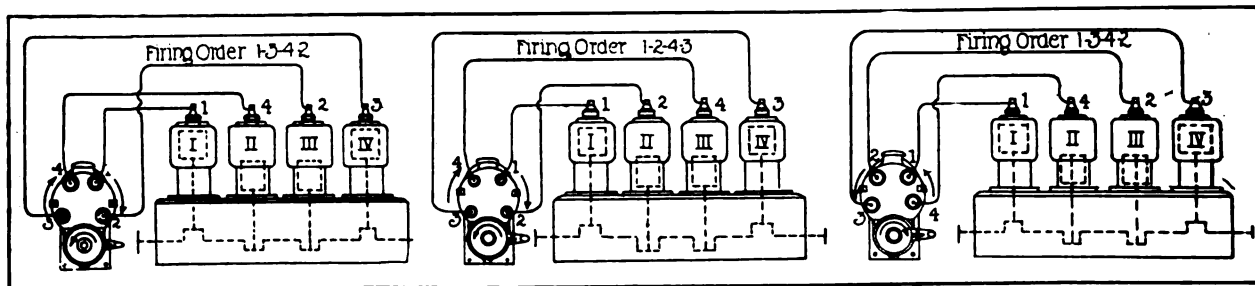


Fig. 15—Wiring Diagrams of Four-Cylinder Magneto: At Left, Magneto Running Clockwise and Firing Sequence 1-3-4-2; Centre, Armature Rotating Clockwise and Firing Sequence 1-2-4-3; at Right, Magneto Running Anti-Clockwise and Firing Sequence 1-3-4-2.

in mind that the distributor rotates in a direction opposite to that of the armature shaft, and that the firing order of the motor must be observed.

Locating Troubles.

The following suggestions for locating ignition troubles, as well as for the proper method of oiling, are made by the makers of various types of magnetos:

Bosch.

Assuming that the spark plug gap is correct and plugs in an efficient condition, examine the secondary cables and all terminals to make sure that no ground exists. If these be in good condition and the fault is not eliminated, disconnect the ground wire, also the secondary wires, then crank the motor briskly and note if sparks bridge the safety spark gap. If sparks are noted the magneto is operating properly. If not, remove the circuit breaker cover and with some one turning the motor note if the contact points separate and see that the gap is correct. Oil or dirt on the platinum points will affect the operation of these members. If the motor stops suddenly, it is generally due to a short circuit in the grounding wire leading from the circuit breaker. This may be tested by disconnecting it. In the examination of the circuit breaker mechanism, especially with new instruments, note if the interrupter lever moves freely. Carbon dust in the distributor is sometimes responsible for erratic operation. Two or three drops of oil should be placed in the cups, the covers of which are marked "Oil", once in about every 1000 miles of service.

Connecticut.

In case of faulty condition make sure the trouble is with the magneto and not with the plugs, carburetor, valves or motor. Examine all connections and the breaker box to see that the contact lever moves freely and that the contacts open and close properly. To test the transformer coil, remove the wire leading to it on the rear end of the magneto. Having the distributor brush in contact with a segment, follow the cable leading from this segment to the plug. Remove the plug, laying it on the motor in such a way that the cable terminal is not in contact or near metal. Take six dry cells and connect one wire from the battery to the frame of the magneto and with the other wire make a quick and sharp passing contact with the back terminal of the coil. This should result in a spark. If it does not, the coil

should be returned to the factory. Use a few drops of oil in the three oil holes about every 1000 miles.

Elseman.

The Elsemann type E M magnetos are lubricated by a few drops of oil in the reservoirs marked "Oil" and the supply should be renewed once in about every 1000 miles. The same general remarks made of high-tension magnetos will apply to this instrument.

Mea.

Practically the same tests as used with other true high-tension magnetos can be employed with the Mea magneto. The use of a few drops of oil about every two or three weeks, depending upon the service, is recommended.

Remy.

Adjustment of the contact points of the Remy magnetos is made from the outside of the cam house, a knurled contact screw being provided. By rotating this member a notch at a time, in or out, the gap is decreased or increased respectively. By regulating this contact screw the adjustment can be made with the motor operating. If the engine misses when running idle or pulling light, the spark plug gaps should be increased. If the motor misses when pulling heavy, particularly at slow speed, the gaps should be decreased. Two oilers are provided, one at the rear of the magneto and the other just back of the top of the distributor. Use three or four drops of oil in about every 1000 miles of service.

Splitdorf.

With the Splitdorf true high-tension magneto failure of the motor to start or stop will generally be found to be due to the grounding wire leading from the breaker box to the switch. This may be tested by displacing the wire, but to stop the motor it will be necessary to short circuit the primary circuit, which can be accomplished by using the blade of a screw driver and making a connection with the metal from the terminal to some metal part of the motor or frame. In the event of other trouble examine the circuit breaker mechanism to see that the contact points open and close properly.

The other Splitdorf types utilize a transformer coil for building up the primary current. If the motor fails to start on the batteries, and the cells are in good condition, go over the connections to make sure they are tight. The brush in the breaker box cover should make contact with the armature shaft and should not be grounded with the metal of the cover.

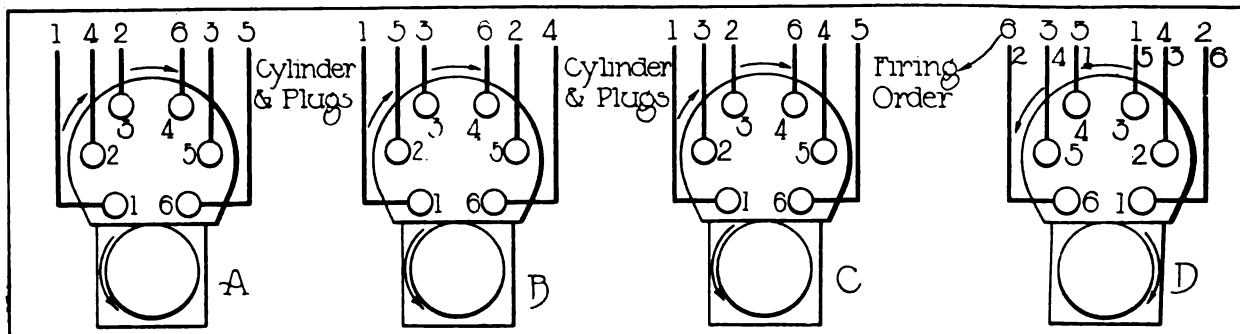
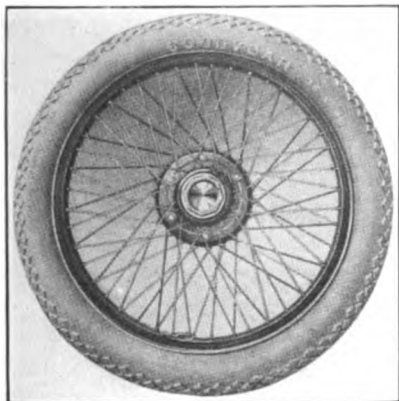


Fig. 16—Wiring Diagrams of Six-Cylinder Magneto: A, Magneto Running Clockwise and Firing Sequence 1-4-2-6-3-5; B, Armature Rotating Clockwise and Firing Sequence 1-5-3-6-2-4; C, Same Direction with Firing Sequence 1-3-2-6-4-5; D, Magneto Running Anti-Clockwise and Firing Order 6-3-5-1-4-2.

SPARE WHEELS AND RIMS SAVE TIME.

INVOLUNTARY stops on the highway certainly have an annoying element in them. To



be forced to stand still after a glorious 40 or 80 miles' ride and use screw driver and hammer or special tire tools, is certainly exasperating. Especially on a hot summer's day, all the effect of two or three hours' airing is lost in a very short time under such circumstances. But troubles will occur, and the best course is to be ready for them, so that they can be overcome as quickly as possible. Next to an inexplicable motor stop, the necessity of a tire change is about the most unpleasant operation known to the motor tourist. This was realized a long time ago and demountable rims were designed to transfer the "dirty" work of tire changing to the garage and reduce the work on the road to jacking up the car and turning a special wrench a few times.

A further step ahead has been achieved by the introduction of wire wheels, which are detachable by unlocking their hubs from the axles on which they are mounted. These wheels permit of extremely speedy change of tires and are carried as easily as spare tires or de-

mountable rims. Many automobiles of high quality are now fitted with carrying apparatus for a spare tire, rim or wheel.

While still in its infancy in America, the wire wheel is undoubtedly making remarkable progress, as the last New York show indicated where there were 10 times as many makes fitted with wire wheels as in 1913. The time when the value of wire wheels was a point of dispute is practically past now, when a number of leading car manufacturers have taken them up as regular equipment and when leading makers of demountable rims include them in their line. Hence scepticism is a meagre virtue in this field today. The strength and durability of wire wheels are matters of fact.

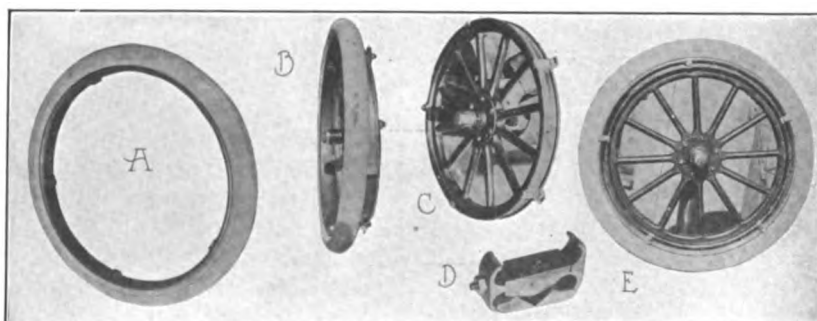
HOUK WIRE WHEEL.

The George W. Houk Company, 1700 Elmwood avenue, Buffalo, N. Y., manufactures the Houk detachable wire wheel here illustrated. This wheel is manufactured under the patents of the Rudge-Whitworth Wire Wheel Company, Ltd. It is of the triple-spoke lacing design and is equipped with the positive automatic locking device,

changing can be made quickly and reliably. It is claimed by the makers of this type of wire wheel that its installation on a car reduces the tire bill 25 per cent. and adds to the easy riding qualities of the automobile.

CHESTER-FORD RIM.

Demountable rims for Ford cars which may be mounted without changing spokes, felloes or other parts of the wheel, are being manufactured by the Chester Demountable Rim Company, Fall River, Mass. This rim is of such simple construction that no bolts which can work loose on the felloe are used; all rings and levers are eliminated and only five nuts are utilized to hold the rim in place on the felloe. The demountable rim is fitted on the clincher rim, which remains undisturbed, and since no changes have to be made, the new equipment may be attached to the wheels within 20 minutes. The retaining construction D is easily mounted on the old rim, as shown at C. The demountable rim which is illustrated at A has spot welded edges and slips over the old rim as shown at B, being secured on the retaining members

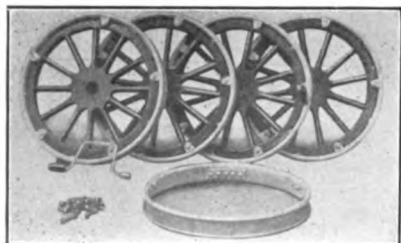


which insures the wheel staying in place after having been attached to the axle, so that

by locking nuts. A double socket wrench for removing and replacing the rims is included.

BAKER DEMOUNTABLE.

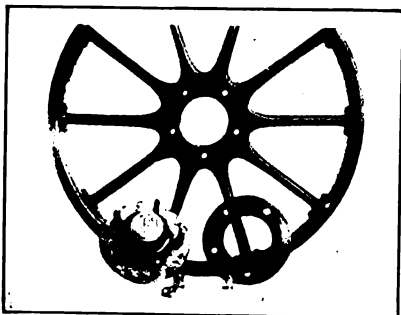
In order to make the Baker rim applicable to Ford model T



cars, the City Auto Tire & Supply Company, 1200 Huron road, Cleveland, O., has placed on the market an equipment consisting of four wheels fitting Ford hubs and including demountable rims, the set comprising the four rim-equipped wheels and a spare rim. To install the new wheels in place on the axles, the nuts and bolts of the old members are removed and the hubs driven out. The hubs are then inserted in the Baker wheels.

CROWN PRINCE WHEELS.

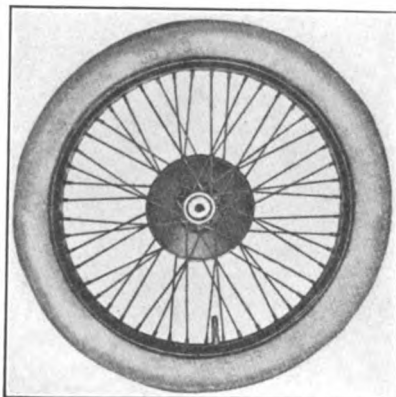
A pressed steel wheel, claimed to be three times as strong as a wooden wheel of its size and at the same time lighter, is made by Max Bacham, 845 Jefferson avenue, Detroit. The wheel is demountable, being held to the hub by five bolts, and the maker states that a wheel can be changed within one minute. Another claim is that this wheel will increase the life of tires mounted on it; it comes fitted with either clincher or quick de-



tachable rims. Of course the strength of the wheel insures it against collapsing, and where other wheels might break in consequence of a collision, this steel wheel will merely be bent.

MOTT WIRE WHEELS.

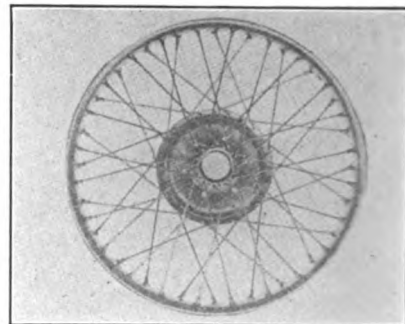
Recognizing the many advantages of wire wheels which have been demonstrated by many manufacturers' tests, as well as racing events, the Mott Wheel Works, Utica, N. Y., has come to the conclusion that the great army of Ford motorists in this country would be interested in this modern type of equipment which permits of a greater tire economy, as well as reduced



car weight, and hence lessened fuel consumption. The low weight of the Ford automobile makes it possible to build a satisfactory wire wheel set for it at a relatively low price, and the accompanying illustration shows the design which was adopted by the Mott concern after a considerable amount of experimenting and testing. The design is simple and strong, and the wire wheels may be easily mounted on the Ford hubs, their installation taking only a short time. The principle utilized in the construction of these wheels is the same as in the successful products of the great European manufacturers.

STANWELD-FORD.

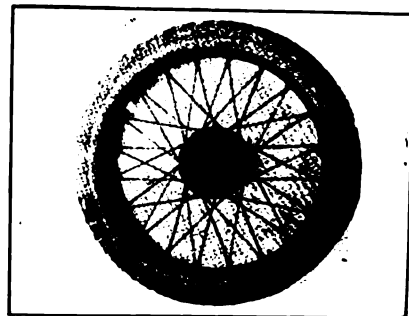
The Standard Welding Company, Cleveland, O., has de-



signed a Ford wire wheel which may be installed, utilizing the old wheel flange and bolts. The hub of the wire wheel is made as a steel stamping, the spokes are arranged according to the triple-spoke method and reinforced at both ends. The entire wheel is finished with a double coat of baked black enamel. The equipment is sold ready for installation on the car.

CAMERON WIRE WHEELS.

One of the several companies that have taken up the manufacture of wire wheels for Ford T automobiles is the Cameron Wire Wheel Company, 47 Adelaide street, Detroit. The wheels are easily mounted, detachable, and designed to carry 30x3 1/2-inch tires. Special studs serve to lock it securely on the hub, and these studs take the places of the old bolts which are used with the wooden wheels.



BIG INCREASE IN AUTOMOBILE EXPORTS.

THE total exports of automobiles, motors, tires and other automobile parts for the 10 months ending April 10, 1914, aggregated \$30,060,043, while during the corresponding period one year ago the amount was \$29,317,044.

The April exports included 3291 cars, valued at \$2,833,154, while a year ago 2766 cars, valued at \$2,904,224, were shipped to foreign countries. The significance of this fact lies in that while the average value of the automobiles exported during the 10 months ending with April, 1913, was \$1049.97, during the same period a year later it was only \$874.55.

While during the earlier period 666 automobiles, valued at \$1,540,127, were imported, the imports of the following year's 10 months totalled 260, aggregating in value \$569,835. This gives an average car value of \$2312.59 for 1913; the average during the second period was \$2191.73.

Exports of automobiles during May, 1914, comprised 1834 cars of a total value of \$1,477,449, or an average value of \$696.42; during the previous year's corresponding period, 1707 cars, valued at \$1,510,782, giving an average value of \$881.05, were sent abroad.

NORTHROP-ROSE.

Well Known Figure in Industry Becomes a Benedict at Block Island, R. I.

At the home of Mr. and Mrs. Almanza Rose, at Block Island, R. I., took place, June 27, the wedding of their daughter, Miss Jessie Almeda, and Richard David Northrop of South Framingham, Mass., the event being attended by a considerable number of friends and relatives. Mr. and Mrs. Northrop are now absent on a wedding journey and will shortly take up their residence at South Framingham.

Mr. Northrop is widely and favorably known, especially to those engaged in the automobile industry and trade, from the fact that he is connected with the Standard Woven Fabric Company, formerly of Worcester, but now of South Framingham, as advertising manager and assistant sales manager. This company manufactures "Multibestos", and Mr. Northrop's activities are directed toward making known the qualities of and marketing its products. He has been extremely active and his work has been singularly productive, and the trade mark of the company

is recognized as one of the standards of the industry and the trade.

Mr. Northrop was born at Middletown, Conn., and was graduated from Wesleyan University. He was associated with several well known banking concerns before engaging with the Standard Woven Fabric Company. Mrs. Northrop's family is one of the oldest of Block Island.

REDDEN TRAVELLING IN EUROPE.

Maxwell Sales Manager Appointing British and Continental Agents.

Charles F. Redden, general sales manager of the Maxwell Motor Company, Inc., sailed recently for Liverpool and London, whence he will travel through Great Britain to appoint a number of district managers. The same will be done in France, Germany, Italy and Russia, which countries Mr. Redden will visit to study the automobile situation.

The Maxwell company, having now completed its first year of successful business, is determined to make every effort to create a big international market for the line of cars which it manufactures.



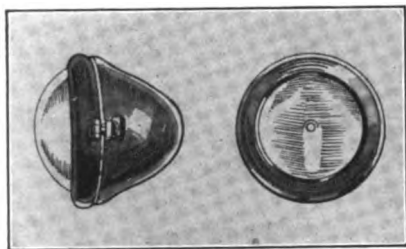
Charles F. Redden, General Sales Manager of Maxwell Motor Company, Inc.

EVER-READY'S NEW FACTORY.

A 200 by 300-foot factory, to be occupied by the American Ever-Ready Company in February, 1915, is under construction in Long Island City, N. Y. The plant will have 500,000 square feet of floor space, employ 2000 workers and is to be made the main factory of the company, the production of which was \$5,000,000 last year.

DIMMING AND ANTI-DAZZLING DEVICES.

AS MANY cities prohibit the use of glaring headlights, tourists whose lighting equipment does not include means for



conforming with the law will do well to give the subject consideration. In several cities the ordinances governing the use of headlights are being strictly enforced. Numerous non-glaring devices are being marketed and some of these are discussed herein. A common form is the frosted globe, such as the Gray & Davis lamp, shown in the accompanying illustration.

NODAZ.

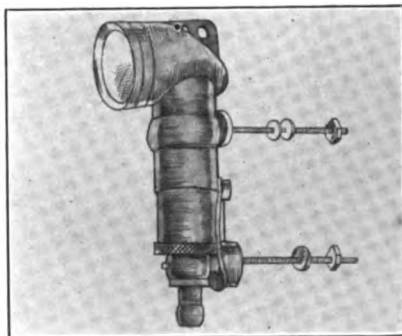
An electrically operated device for eliminating the glare of the electric headlights is the Nodaz, made by the Ward Leonard Electric Company, Bronxville, N. Y. One of the qualities of the design is that the full candlepower of the lamps may be utilized in the city without conflicting with the ordinances. It comprises two pairs of translucent wings which are opened



and closed by magnets in the cover of the lamp, and are operated by a button convenient to the driver. With the wings closed the glare is eliminated. The Nodaz may be attached to any headlight. It has been approved by the Chicago authorities.

ROFFY LAMPS.

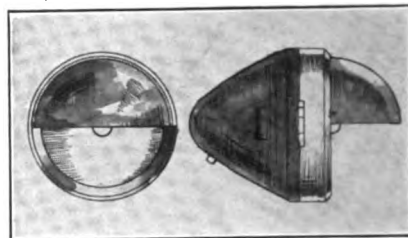
The Roffy lamp, made by the Roffy-Grace Corporation, 1926 Broadway, New York City, presents a number of interesting features, among them being the elimination of glaring effects. The lamp is very compact and



light, and is attached to the radiator by two small bolts. The locking method is held to prevent injury to the cooler. Glare is eliminated by the use of a conically shaped achromatic light beam with sharply defined edges, so projected that the upper boundary is parallel with the ground. This light is rectified for chromatism, aberration and diffraction, producing an even field of white light. It is stated that the rays will illuminate for about $1\frac{1}{2}$ city squares, and since the upper edge of the light beam is never more than $4\frac{1}{2}$ feet from the ground, there is no glare in the eyes of the persons on the highways.

BROWN.

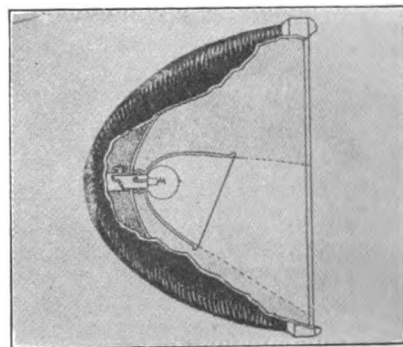
The Brown Company, Syracuse, well known maker of tire



pumps, is marketing the Brown deflecting headlight, which eliminates the glare of the electric lamps by a semi-dome metal reflector or shutter. This shutter is operated by a little electric motor, and when regulated as shown the upward and horizontal rays are deflected downward and ahead, eliminating the glare without reducing the efficiency of the rays. The motor is operated by a button.

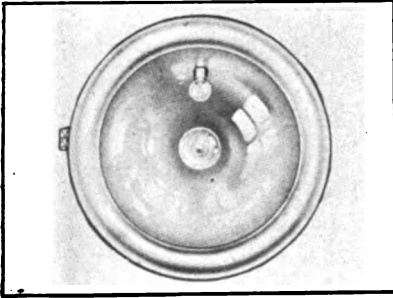
LEGALITE.

The Legalite, made by the Legalite Reflector Company, 1503 Bryant avenue, Bronx, New York City, eliminates glare by projecting the rays in such manner that the top of the beam is parallel with the ground, while the bottom of the beam strikes the ground close to the car. This is obtained by the use of the auxiliary reflector.



GRAY & DAVIS.

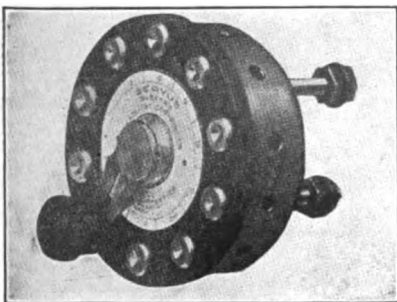
Gray & Davis, Inc., Boston, makers of lighting and starting



systems, lamps, etc., is producing an electric headlight which conforms to the laws of various states. It comprises the conventional headlight with a small bulb mounted at the top of the reflector and in such manner that it does not impair the efficiency of the centre or regulation bulb. The small light is used in the cities and is controlled by the switch, being lighted when the button is moved to the "Side and Rear On".

SERVUS.

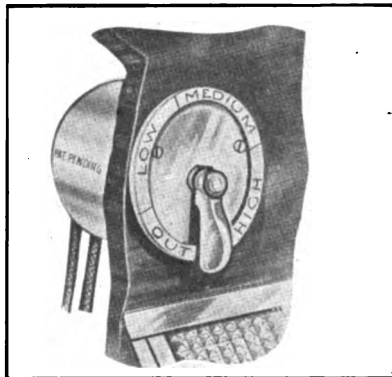
The Servus Equipment Company, Newark, N. J., is manufacturing the Servus headlight controller for cars equipped with electric lighting. It is constructed to enable the driver to dim, extinguish or brighten the lights without leaving the seat. The device comprises a coil of special resistance wire divided into 10 sections with contact



points so arranged as to allow all, any part or none of it to be brought into circuit. When the lever is placed at the "low" point, the lights will burn dimly. Moving the lever to other points increases the strength of the current and proportionately so. There is also an "off" position.

CHANNEY.

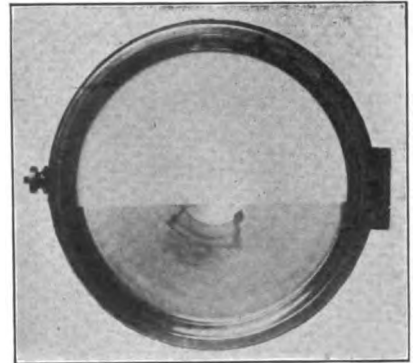
The dazzling effect of electric headlights is eliminated in the Chaney headlight dimmer, made by the L. F. Chaney Company, Springfield, O., by a simple, compact switch arrangement shown in the accompanying illustration. One of the qualities of the design is that the lights may be regulated to meet all re-



quirements. The device is easily installed by the owner without a knowledge of electricity, for, as will be noted, the wiring is very simple. The dimmer is mounted on the dash and, being equipped with a kick type of switch, the driver can move the last-named member to each of the four positions provided. Placing the lever to "Low" effectually dims the lights, eliminating glare. Medium and high positions are included, also an "Out". The Chaney dimmer is installed by boring three small holes in the dash to retain the plate, and a fourth opening is made for the shaft.

MULCHAHEY.

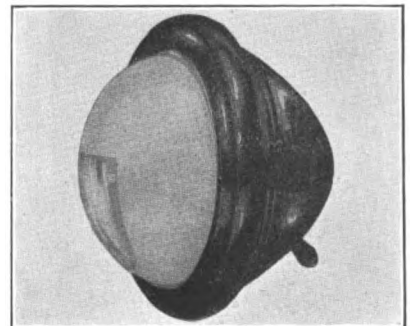
The Mulchahey dimmer, made by Howard F. Mulchahey,



Providence, R. I., consists of the glass of the electric headlight being frosted to a point just below its centre. This eliminates the glaring effect by softening the rays, but does not impair the efficiency of the light, as the lower half of the glass is untreated. The process is said to be inexpensive and the regular glass can be treated.

J-M LENS.

One of the qualities of the J-M lens, an anti-glaring device, marketed by the H. W. Johns-Manville Company, New York City, is that it can be attached to any standard electric headlight. The J-M lens is made of a high-grade annealed glass, hemispherical in shape and frosted over its entire face, with the exception of an oval area, three by five inches, below the centre.



CARBURETION TROUBLES AND THEIR REMEDY.

Presenting Standard Types of Carburetors and Directions for Cleaning and Adjusting— Suggestions for Obtaining Economy and Efficiency.

CARBURETOR makers have so perfected their product that it rarely gives trouble. The dash and steering control of the air and

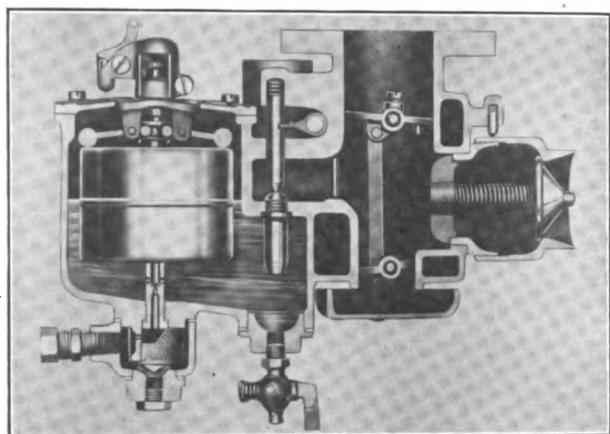


Fig. 1—Sectional View of Model A Rayfield Carburetor, a Water Jacketed Type.

fuel, the use of heated air and the mounting of the carburetor in a higher position, eliminates many difficulties formerly experienced when the carburetor was more or less exposed to the weather. Improvements have been made in the devices for preventing the entrance of water and other foreign deposits in the fuel, and if the motorist will occasionally empty these filters and insist upon all gasoline being strained, he is not likely to experience trouble on the road.

A knowledge of the parts utilized for adjusting a carburetor is important in the overhaul of the motor and it will be of service on the road, particularly for owners of machines not provided with dash control devices. Carburetors are not so complicated as some imagine and a little study of the design utilized should enable one to adjust the carburetor so as to obtain an efficient as well as economical mixture. Views of standard makes are presented herein with their components lettered, which will prove of service in making adjustments or cleaning.

In addition to cleaning the carburetor, the tank should be given attention, especially if the car has seen considerable service since the last overhaul. If the container is located under the

front seat, its fastenings may have worked loose, and if they are not tightened a leaky tank is apt to result. Many times failure to obtain maximum mileage a gallon of fuel is due to minute leaks. Care should be exercised in soldering not to expose any vapor to a flame. Repairing tanks is best left to the tinsmith. Clean the tank thoroughly, as well as all pipe lines, and make sure that all connections are tight. If the pressure fuel system has been giving trouble, go over all connections, etc., with soap suds. If any leaks exist, they will be noted readily by the bubbles produced.

Rayfield.

The Rayfield carburetors, made by the Findeisen & Kropf Manufacturing Company, Chicago, are made in several types, two of which are illustrated. Fig. 1 shows the model A, a new design, which is water jacketed. The model B is similar, being constructed without water jackets. The new model has many improvements, among which is the method of float control. Instead of a weight on the needle itself in a chamber beside the float, fulcrum levers are utilized directly above the float as indicated in the sectional drawing at Fig. 1. The two fulcrum levers control the needle valve, the stem of which extends through the brass float. As the last named member rises, the arms lift, and the fuel supply is restricted proportionately to the upward movement. The fuel inlet is now below the float chamber. A quality of the new design is the fitting of an efficient strainer trap, so constructed that the fuel connection may be turned by simply detaching and attaching the fuel line, etc. A large water and sediment pocket is provided with a conventional draining cock. The throttle arm stop has a positive locking device.

Features of the Rayfield types are the constant, mechanical and automatic air valves. The fixed one supplies air at all speeds, the mechanical one works in conjunction with the throttle and the automatic at varying speeds, supplying air when called upon by the motor.

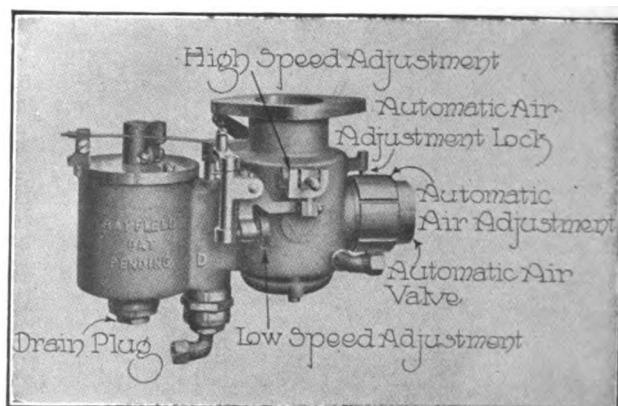


Fig. 2—Model D Rayfield with Components, Utilized in Adjusting and Cleaning, Lettered.

The adjustment of Rayfield carburetors is simple. The low speed (see Fig. 2) is set first by turning the low-speed screw to the left until the arm member above it and slightly to the right just breaks contact with the cam above that. Next turn the low-speed screw $1\frac{1}{2}$ turns to the right, open the throttle about one-quarter, prime the carburetor and start the engine. Close the throttle until the motor runs slowly without stopping, then turn the low-speed screw to left, cutting down the fuel, and do this one notch at a time until the motor idles smoothly. The desired speed may be obtained by the adjustment of the screw in the top arm to the left.

Open the throttle slowly until wide open. If the motor backfires, turn the high-speed adjusting screw to the right, a half turn at a time, until all cylinders fire evenly. Should the motor not backfire, turn the high-speed screw to the left until it does, then to the right until it runs smoothly. This makes for economy of fuel and efficiency.

The novice in attempting his first adjustment of the Rayfield is apt to make the mistake of cutting down on the fuel, or in other words, obtains too lean a mixture, making it sensitive to climatic changes. The low speed should not be touched in setting the high, but, should the motor backfire with the throttle about one-quarter open, the automatic air valve adjustment should be given a turn or two to the right to decrease the tension of the spring and decreasing the amount of air slightly.

When touring in very high altitudes the air valve should be so adjusted that it seats a trifle lighter, and the maker also recommends cutting down slightly on the low and high-speed fuel adjustments. It should be borne

a r m s o r

pointers on the dials. Set the intermediate speed first, moving between the figures 1 and 3, and advance spark and open throttle, noting results. Moving the arm towards 3 enriches the mixture. The high-speed arm is set with the throttle wide open. The auxiliary air valve should seat lightly.

In setting a carburetor the odor of the exhaust should be noted. When properly adjusted it will have a sweet smell. Too rich a mixture is indicated by dense clouds of black smoke and a pungent odor.

Stromberg.

But two adjustments are utilized with the Stromberg carburetors and these are not difficult to set, being shown at N and L N at Fig. 4. The low speed is set first by turning the nut N up or down until the spring S 1 seats the valve A V lightly, just sufficiently to retain it in its seat. The high speed is adjusted with the throttle open and spark advanced, rotating the nut L N up or down to obtain the desired results. The height of fuel in the float chamber and proper size nozzle is determined at the factory.

MOLINE-KNIGHT MOTORS ON MARKET.

Engine Department of Company's Plant to Turn Out 20,000 Motors.

The Moline Automobile Company, Moline, Ill., will hereafter manufacture Knight motors for the market, thereby expanding the working field of its motor department, which last year turned out 18,000 motors. At the same time, Moline automobiles will continue to be equipped with Knight

sleeve-valve motors. The four by six model tested several months ago for 336 continuous hours in the laboratory of the Automobile Club of America, will also be built for the open market.

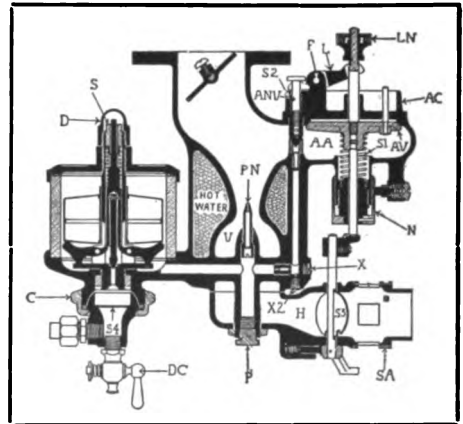


Fig. 4—Sectional View of Stromberg Carburetor.

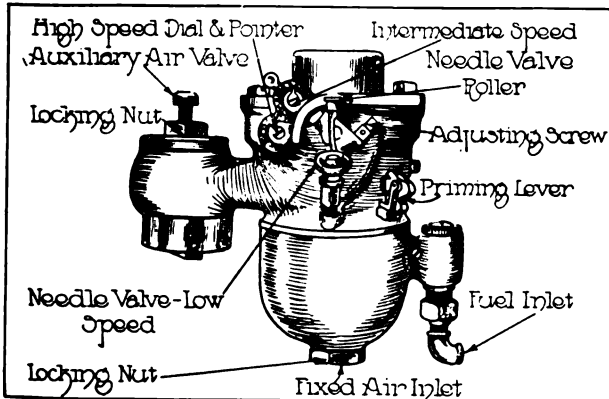


Fig. 3—Model L Schebler Carburetor Having Three Fuel Adjustments.

in mind that the automatic air valve must be seated when the motor is idling. Starting is made easier if the throttle is advanced but one-quarter way open.

Zenith.

The Zenith, made by the Zenith Carburetor Company, Detroit, is another type that requires little if any attention from the motorist after it has been installed. One of the features of the construction is the compound nozzle. A quality of the Zenith emphasized is that the mixture is practically constant at all motor speeds. Efficiency is claimed at high as well as low altitudes, and there is but one adjustment to be made by the owner, the low speed, regulating the supply of air. Moving the low-speed screw in enriches the mixture, while the opposite adjustment provides a leaner mixture. As previously stated, the setting of the Zenith carburetor is the selection of the proper size of choke or venturi tube and gasoline jets and secondary well, factors determined at the factory.

Schebler.

Several types of Schebler carburetors are made, these including F, L, O and R. F and L have single jets and provision is made for the adjustment of high, low and intermediate speeds, and both have the lift type of needle, providing proportionately more fuel with the speed of the motor increasing. The model L is adjusted by screwing in the low-speed needle valve, Fig. 3, until it seats, then opening about $1\frac{1}{2}$ turns. With the throttle about two-thirds open the motor is started and the needle valve adjusted until the engine runs smoothly. The intermediate and high speeds are adjusted by the

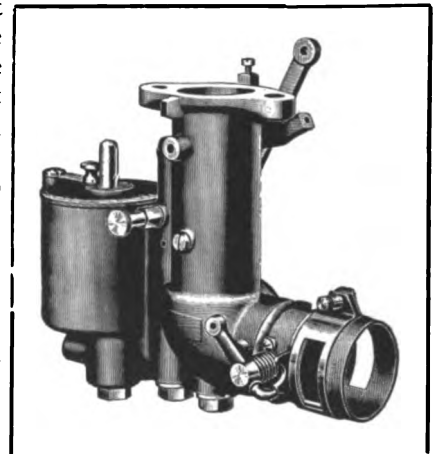
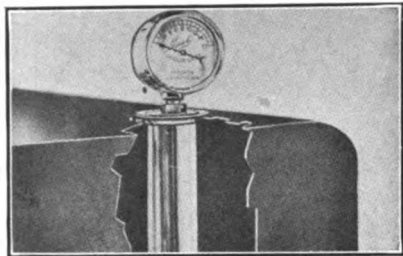


Fig. 5—The Zenith Carburetor Has but a Single Adjustment.

FUEL ECONOMIZERS, LOCKS AND FILTERS.

HANS TANK GAUGE.

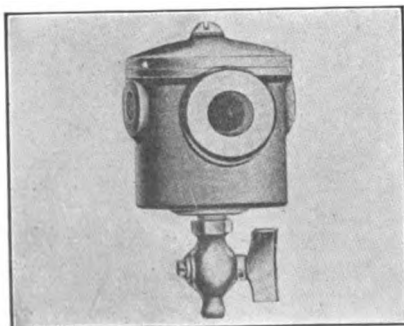
The Hans Motor Equipment Company of La Crosse, Wis.,



maker of fuel gauges, is manufacturing the design shown in the accompanying illustration. It is mounted with its float chamber directly in the tank, the dial case being the only part visible. This design is for machines where the fuel container is very accessible. The hand, which moves over a calibrated dial, is operated by a magnet.

R. O. C. SUPERHEATER.

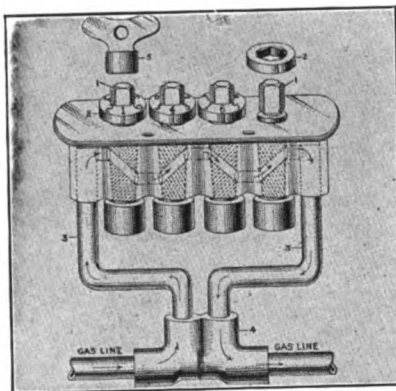
The R. O. C. superheater, marketed by the National Economic Supply Company, 1777 Broadway, New York City, is a device for raising the temperature of the fuel before it reaches the carburetor, and consequently while in a liquid state. The heat of the exhaust gases is utilized to raise the temperature of the fuel, the superheater being connected to a branch



line of the exhaust. The advantages claimed for the device are rapid vaporization of the fuel, a more homogeneous mixture, in that precipitation is prevented, greater economy and less carbon. It is stated by the maker that low grades of fuel may be successfully used without carbonization.

SECURITY AUTO LOCK.

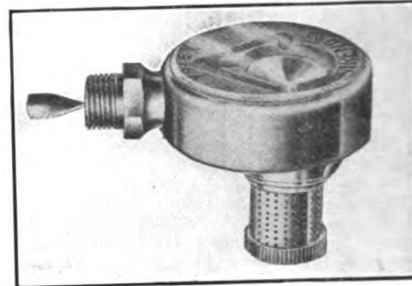
One of the most practical methods of preventing use of the car by others than those intended is to lock the fuel supply. The Security Auto Lock Company, 1733 Broadway, New York City, is marketing the Se-



curity auto lock, an ingenious device, which is placed in the fuel line between the supply and the carburetor. Being located on the dash, it is convenient to the driver. It comprises four valve members in a row, each having a passage for the fuel. The gasoline enters and flows as indicated by the arrows in the illustration, but it can pass only when the valve mechanism is set in a certain position. The failure of one of these valves, of course, locks the device. The lock is operated by a small wrench key, and a large number of combinations are possible.

THE VOTEX.

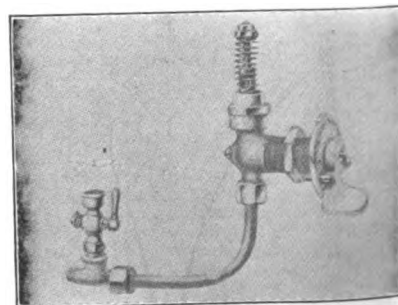
The Votex, made by the Sireno Company, 20 Rose street,



New York City, is fitted in the intake manifold between the carburetor and the cylinders. It is held to be automatic in its action, delivering a certain amount of air to an imperfect mixture, and as required. The maker claims that the device not only provides a perfect mixture, but makes for a very flexible motor.

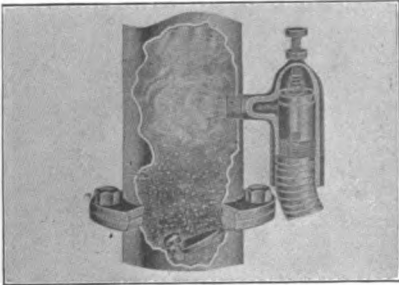
AUTO-VALVE SAVER.

The Auto-Valve fuel saver, marketed by the Crary Company, Detroit, differs from the conventional types in that a manual control is provided, as well as the automatic one. The dash control enables the driver to close the automatic member when starting. After the motor has become warm the automatic valve controls the supply of air. A priming cup is also included, located near the intake manifold.



PEERLESS FUEL SAVER.

The Peerless fuel saver, manufactured by the Peerless Motor



Specialty Company, Inc., New York City, for which the Harding Specialty Company, Inc., 755 Boylston street, Boston, is sole distributor, utilizes heated air, but in a different manner from conventional practise. A flexible metal tubing is connected with the saver, which is tapped into the intake manifold as shown. The heated air is injected and controlled automatically, and is supplied according to the demands of the motor.

J. & B. FUEL SAVER.

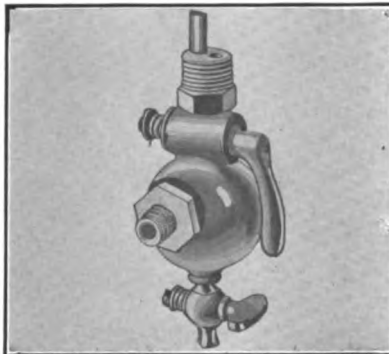
The J. & B. fuel saver is manufactured by Jones & Buckoke, 1413 Michigan avenue, Chicago, and economy of fuel and an efficient mixture are obtained by admitting air automatically and according to the speed of the engine. The device is fitted to the driver's side of the dash and is connected to the intake manifold by a flexible tubing. When the motor is running slowly, the



automatic valve is closed. The principle involved is that of admitting atmosphere when it is supposed that too large a quantity of gasoline is emerging from the jet of the carburetor in proportion to the air, when the motor attains high speeds.

TRIO FILTER.

The Trio Manufacturing Company, 1206 Bellevue avenue, Detroit, is marketing the Trio, which is a combination sediment trap and gasoline reserve supply device, which is intended to eliminate the necessity of carrying extra fuel. It is designed especially for those machines not equipped with auxiliary fuel tanks, and the maker of the Trio states that it not only insures a reserve sup-

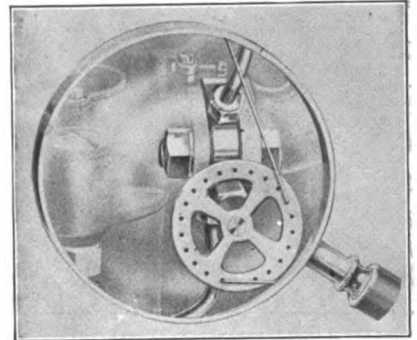


ply, but provides a rigid tank connection.

A sediment trap for catching all foreign elements and a shut-off valve to the carburetor are included in this device. Fuel for priming purposes, etc., is obtainable by means of a petcock. As shown by the illustration the valve is in a closed position. When the lever is moved to a forward position, the reserve supply is obtainable. With the lever turned half-way over to an opposite position, the tank may be drained. The valve is of large dimension and is ground to a gasoline tight fit.

ALDERMAN PRIMER.

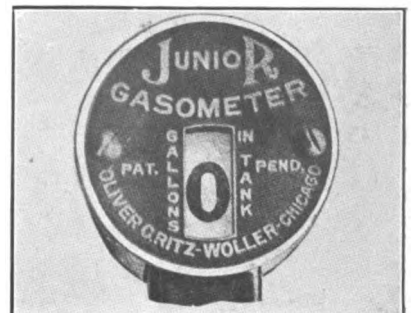
The Alderman Manufacturing Company, Rochester, N. Y., is



introducing the Alderman primer and power magnifier. The primer is constructed to be operated from the seat or in front of the car, and the fuel is sprayed into the intake manifold. The power magnifier mixes superheated air in the proper proportion with the vapor from the carburetor, the heat of the exhaust being utilized and the air being carried through a special tube to the device.

JUNIOR GASOMETER.

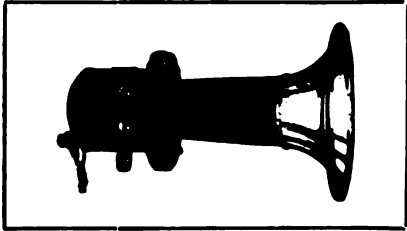
The Junior gasometer, made by Oliver C. Ritz-Waller, 538 Clark street, Chicago, is a smaller form of the Ritz gasometer, designed for large cars. The device is a circular, dial-like member; the principle employed is that of a pneumatic control of the indicator. Figures are shown denoting the supply.



HORNS TO MEET THE NEEDS OF MOTORISTS.

KLAXON HORN LINE.

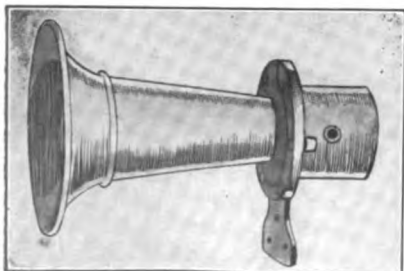
The pioneer among electric horns, the Klaxon signal is



one with which every motorist in this country is familiar, and with the name of which a definite idea of shape and sound has become associated. The accompanying illustration is of the original type, the Klaxon proper, there being three models of this class of horn, Klaxon, Klaxet and Klaxonet.

REXO II SIGNAL.

The Garford Manufacturing Company, 2506 Olive street, Elyria, O., has brought out this year a very low-priced electric vibrator horn, designed on the same principle as the original REXO and utilizing the same high-grade material and workmanship in its makeup. The cheapness of the new model is due, the company states, to the tremendous quantity production planned, the output being scheduled at 100,000 horns. The horn produces the signalling sound by means of a diaphragm vibra-



brated through the action of a coil, the armature of which makes and breaks an electric circuit if the push button controlling the operation of the horn is pressed by the driver. The REXO II is finished half in black, half in nickel or brass.

CLERO ELECTRIC HORN.

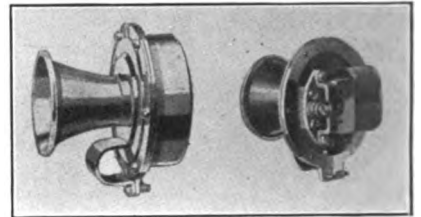
Made by the Fitzgerald Manufacturing Company, Torrington, Conn., the Clero electric horn has been placed on the market recently. This horn is of the vibrating diaphragm type; the actuating principle is an electromagnet, the armature of which carries a hammer, which strikes against a steel diaphragm



at great speed and with great force, so that a very loud and very striking sound is produced. The horn is made dust, rain and fool proof, and, therefore, serviceable under practically any condition. The installation of the horn is extremely simple and can be made in a few minutes. The horn is secured to the dash or any other suitable part of the car by means of screws, and is connected to the dry cells by attaching one pair of cable ends to the two terminal screws projecting from the interior of the horn and the other ends to the terminals of the cells. The price of the horn is moderate. It comes in several styles of finish.

MAXI II SMALL HORN.

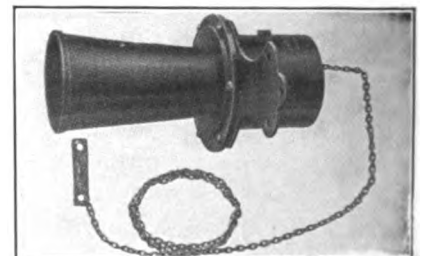
One of this year's products of the Garford Manufacturing



Company, 2506 Olive street, Elyria, O., is the Maxi II electric horn, a signal of small size, specially suited to the requirements of the motorcyclist and small or cyclecar owner. This horn has a short projector finished in black baked enamel, and is operated by a push button switch of the lever type, mounted on the handle bar close to the grip.

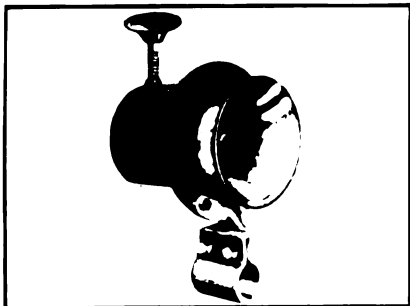
CABLEPHONE HORN.

A new horn recently announced by the Automobile Supply Manufacturing Company, 220 Taaffe place, Brooklyn, N. Y., is the Cablephone, here shown. This horn is of the hand-operated class, but is not worked, as is the conventional practise, by means of a push lever, but by a cable, the end of which is mounted on the dash or steering wheel, and which, if slightly pulled by the driver, actuates the signal. The horn is sold with a complete set of fittings for installing it.



KLAXON HAND SIGNAL.

As an addition to its line, the Lovell-McConnell Manufactur-



ing Company, Newark, N. J., is now making a small type of hand-operated Klaxon signal, which is substantially the same as the original hand-actuated type, except for its size. This makes it specially desirable for small vehicles, motorcycles, etc., where the strength of the Klaxon sound is desired without the volume of the sound produced by the larger signals.

HOLTZER-CABOT HORN.

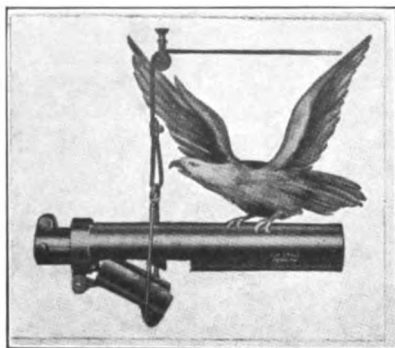
The Reacto horn, made by the Holtzer-Cabot Electric Company, Chicago, and Brookline, Mass., is of the simple hammer blow type and is stated by its maker to have no wearing parts. The heavy armature or hammer strikes the diaphragm squarely and rebounds with such speed as to give unrestricted vibration. It is said that this principle has the effect of producing a clear, consonant tone. Condenser protected platinum



contacts are used. The horn is constructed so simply that there is hardly a chance for it to get out of order. The Reacto has been on the market for a considerable time and given general satisfaction, so that this year's model is practically the same type as was offered before, save for minor refinements.

EAGLE EXHAUST HORN.

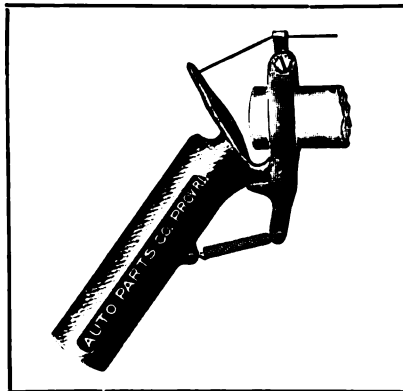
Many automobilists prefer the exhaust type of signal to the electric or hand-operated styles, principally because this sort of horn gives or can give a musical note coupled with great strength, while the electric apparatus vibrating a diaphragm produces, in practically all cases,



an effective, though harsh signal sound. One of the popular types of exhaust signals is here illustrated, being the Eagle whistle, which is attached to the exhaust pipe at the rear of the muffler and controlled by a pedal and wire rope. Pressing the pedal closes the by-pass valve, which ordinarily permits the exhaust to flow unrestrictedly from the cut-out into the atmosphere. The passage of exhaust gases through the horn, produces a deep, musical chime. The material of the horn is not liable to attack by the exhaust gases. The device is made by the Bi-Motor Equipment Company, 177 Portland street, Boston, Mass.

AUTO PARTS HORN.

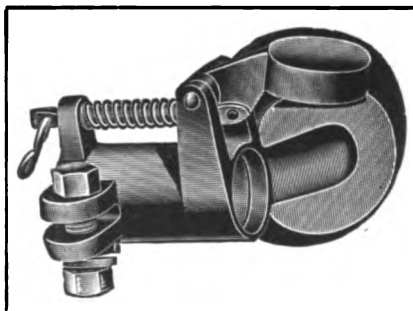
The Auto Parts Company, Providence, R. I., is marketing



an exhaust horn of simple construction, which is here illustrated. The horn is attached to the muffler end, and if the cable is pulled, the mouth of the horn is brought up against the muffler, the gases taking the path through the latter and producing the signalling sound, lasting until the cable is released.

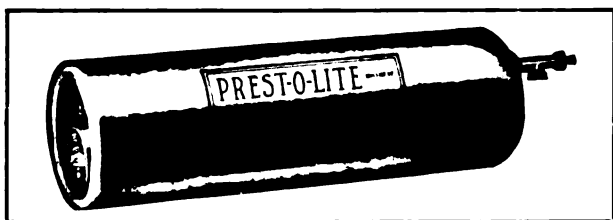
TREMO FORD SIGNAL.

An exhaust signal specially designed for Ford cars is the Tremo, made by the D. Henry Bonner Company, Cambridge, Mass. This horn is so constructed that it cannot clog, or hum when no sound is desired. No coupling is required to install it, as the horn shank clamps directly over the end of the exhaust pipe. The sound of this device is equally full and strong at high or low engine speed. Its price is within the means of every Ford owner.



CARE AND MAINTENANCE OF GAS TANKS.

BECAUSE of the simplicity of acetylene light, users of the Prest-O-Lite tank do not always obtain that efficiency and economy possi-

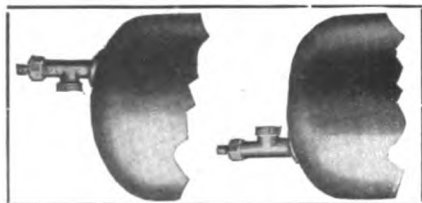


The Prest-O-Lite Gas Tank.

ble with this system of illumination. When the proper size burners are used, the flame maintained at the correct height, the lamps set and focussed correctly and the supply line gas tight, an efficient, economical light is assured. These conditions may be obtained by the owner without involving expense, and for the benefit of those not familiar with the proper operation of the Prest-O-Lite system the suggestions for its care and maintenance will be of value.

The Prest-O-Lite system consists of pure, clean acetylene stored and controlled in a seamless steel cylinder filled with asbestos discs. These discs are saturated with a liquid chemical which has the property of absorbing and dissolving acetylene, making possible the storing of a large quantity of gas in a small space.

One end of the cylinder is provided with a gauge, indicating the supply, and the three styles utilized are shown in an accompanying illustration. One registers the pressure in atmospheres (marked ATM), another pounds and the third both atmospheres and pounds. The pounds pressure of the atmosphere tank can be readily estimated by multiplying the pressure in atmospheres by 15, since the tanks are charged to a pressure of 225 pounds, approximately 15 atmospheres.



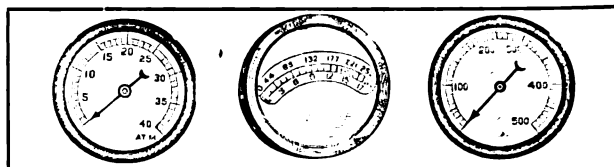
Attaching Tank: At Left, Proper Method; at Right, Wrong Way.

Some users of the Prest-O-Lite tank believe that some tanks are sent out not fully charged, especially in the winter time. This is incorrect, as the pressure varies according to the temperature. The cylinders are filled at 60 degrees Fahrenheit and in

cold weather the gauge may show only 135 pounds (nine atmospheres) or less, which is lower than the word "full" on one style of gauge. During warm weather the pressure in a fresh cylinder may be as high as 315 pounds (21 atmospheres), causing the indicating hand to pass out of sight beyond the word "full". This leads some to imagine that the tank is not fitted with a needle.

The variation in the readings caused by different temperatures in no way affects the contents, which are determined by weight, not by volume. If desired, the motorist may demonstrate this change in readings by taking a tank from a warm into a cold place, or vice versa.

Some owners in installing a tank place the valve in the wrong position. It should be placed uppermost, as shown in an accompanying illustration, providing a free and unobstructed flow of gas. If improperly attached, as it has been seen by the writer on several cars, the liquid chemical



Gas Tank Gauges: At Left, Indicating Atmospheres; Centre, Pounds and Atmospheres; Right, Pounds.

in which the acetylene is dissolved may escape into the pipe line, checking the flow of gas and discoloring the flame. The motorist is cautioned to make sure that the garage attendant places the tank with the words "This side up", on top.

The Prest-O-Lite Company states that a tank should not be placed underneath the running board or frame, near the muffler or artificial heat, or mounted where it will chafe against metal, etc. Leaks should be guarded against, for minute leaks are largely responsible for inefficiency. When rubber tubing is employed it should be inspected from time to time, as it is affected by the elements, becoming hard and full of tiny cracks. Brass or copper tubing, unless rigidly mounted, will chafe.

If it be suspected that maximum service is not being obtained from a tank, that is, it is not giving sufficient lighting hours, prepare a heavy soap suds and smear it all along the pipe lines, joints and connections. Any leaks will be noted easily by the bubbles given off. Never use a flame to detect a leak. The company markets an

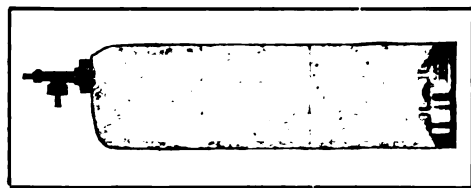
inexpensive special pipe-line tester, or its use may be obtained at any of the numerous service stations maintained.

The height of the flame is important. It should be as high as possible without blowing and as nearly level across its top as possible. The practise indulged in by some owners of turning the flame down so low that the points do not meet is not recommended, as it tends to carbonize the burner openings, clogging them.

Frequently, gas is wasted by the use of too large a burner for a certain size of reflector, a tendency confined principally to the smaller sizes of lamps. The following guide will be found helpful:

With reflectors five inches in diameter and less, use $\frac{1}{2}$ -foot burners; with reflectors five to six inches in diameter, use $\frac{5}{8}$ -foot burners; with reflectors six to $6\frac{1}{2}$ inches, use $\frac{3}{4}$ -foot burners; with reflectors $6\frac{1}{2}$ inches and larger, use $\frac{7}{8}$ -foot burners. In view of the many varieties of lamps, there is bound to be a slight variation, but the above will be decidedly useful in testing to find the correct size.

The proper focus and correct angle of a lamp



Sectional View of Prest-O-Lite Gas Tank.

are important. With the properly sized burner the flame and mir-

ror lens should be properly located in relation to each other. To test the focus, hold a white sheet of paper three or four feet in front of the lamp. If the focus is correct a clear, white field of light will be obtained, and in addition, a clear, inverted picture of the burner and the flame will appear on the sheet. If, in making this test, a round or crescent shaped dark spot should appear in the field of light, the lamp is out of focus, and the burner or mirror should be moved backward or forward, as needed, until these dark spots disappear.

The proper angle of a lamp is important. The face of the lamp should be perpendicular, and if tilted up, the light goes too far in advance of the car. If tilted down, the rays strike too near the machine. The position of the lights is easily tested with a plumb line (a string with a little weight attached), to see if the face is perpendicular.

In some instances where the lights are mounted unusually high, the lamps will have to be tilted slightly downward, and in all installations the

principal beam of light should strike the ground about 30 feet ahead of the car. The adjustment recommended by the company is obtained by directing the right lamp very slightly to the right and the left lamp to the left. A straight-edged board extended across the face of both lamps will serve as a guide, and the inner edge of each lamp should be brought forward about $\frac{1}{4}$ -inch further than the outer edge. This will obtain a diffusing beam, lighting the side of the road. If it is necessary to bend the lamp



The Proper Height of Flame.

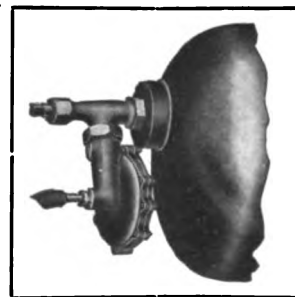
brackets, two wrenches should be employed, one holding while the other is utilized to do the twisting, etc.

Users of the gas tank are cautioned against opening the valve too wide when lighting the lamps. The valve should be turned slowly with the key, and the flame should never hiss or tremble when the match is applied. Too high a flame spells waste of gas and in addition a mirror is likely to become damaged.

Many motorists have fitted the Prest-O-Lite automatic reducing valve, which relieves the owner of the necessity of regulating the supply. The valve is easily attached, inexpensive and provides the correct pressure at all times, whether the tank be full or nearly empty. With this valve one person can turn on the gas and light the lamps with a minimum of effort, and economy is also obtained. If acetylene side and tail lights are desired, the reducing valve will control the supply to these members.

JOHNSON IS DIXON'S CHICAGO HEAD.

Dudley A. Johnson, who for a number of years was the assistant of the late Sam Meyer, has succeeded the latter in the position of Chicago branch manager of the Joseph Dixon Crucible Company. After having been connected with P. F. Pettibone & Company and the Holyoke Envelope Company, Mr. Johnson entered the service of the graphite company in 1898; not long after he assumed charge of the crucible and black lead department of the company's Chicago branch.

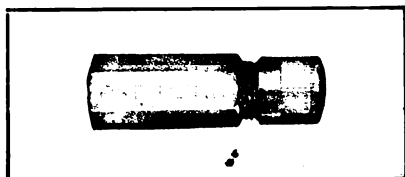


Automatic Reducing Valve.

PRACTICAL TOURING EQUIPMENT.

SMITH TIRE VALVE.

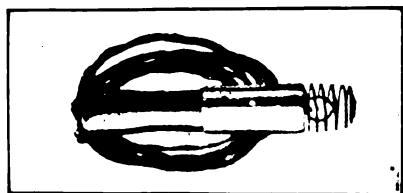
A device for facilitating the proper inflation of tires is



being manufactured by the Smith Tire Valve Company, box 1965, Boston. It is easily attached to the valve stem, the plunger of which is removed, as the Smith device replaces this member. One of the qualities of the Smith device is that the largest sized tire may be inflated with a minimum of effort with a hand pump. Another feature that will appeal to motorists is that the Smith valve opens with a slight pressure. The Smith tire valves come in sets of four.

MABEY LAMP.

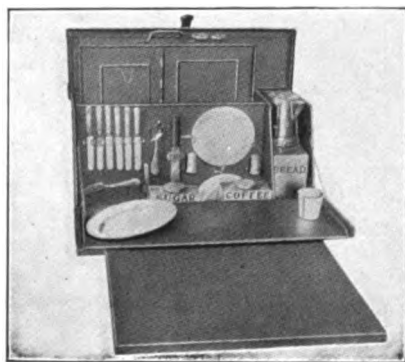
Mabey's Electric & Manufacturing Company, 940 North Pennsylvania avenue, Indianapolis, Ind., is marketing a novel type of inspection lamp which presents several practical features. It is called a combination trouble and spot light, is shaped similar to a cigar, and is very compact. The bulb is protected by a wire cage when used as an inspection lamp and when not in service is prevented from being broken by a telescopic joint. The last-named



member provides the spot light feature referred to. Suitable length of cord is provided. The Mabey lamp is low priced.

KITCHENETTE.

A compact, practical cooking equipment, termed the Prentiss kitchenette, is being marketed by the Prentiss Manufacturing Company, Racine, Wis., specialist in cooking outfits for tourists. The one illustrated is the No. 1 or six-party outfit, containing a full set of dishes with the necessary knives, forks, spoons, and, in addition, containers for coffee, sugar, salt and pepper. There are also frying

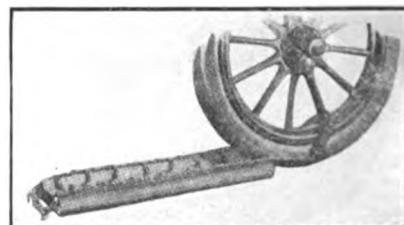


and baking pans and other cooking utensils. The dishes are made of the best white enameled ware.

The case is constructed of No. 22 gauge steel, nicely finished in black, and adjustable leg supports are fitted to the outer leaf of the table. All openings are felt lined to exclude dust and foreign elements. The case measures 28 inches long, 17½ high and 12 wide. The net weight is 75 pounds. Gasoline is employed as a fuel with the folding stove, which has three burners, two of which are for cooking, while the other supplies heat to the oven.

ROHE CAR BLOCK.

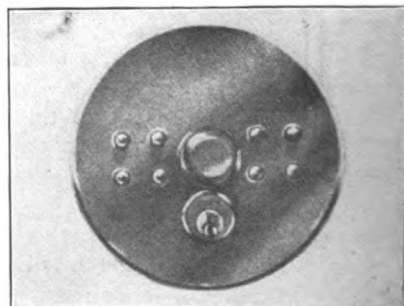
The Rohe motor car block, marketed by the Rohe Traction



Block Company, Kenmare, N. D., is designed to extricate the machine from mud, etc., when ordinary methods fail. The block is approximately 30 inches long and is put in place, as shown in the accompanying illustration, with a chain attached to a strap. When the power is applied, the wheel in revolving draws the chain and block under it, thus providing a tractive surface.

THE LOCK-ALL.

The H. P. B. Electric Company, 500 Fifth avenue, New York City, is manufacturing the Lock-All, a device for controlling the lights, ignition and electric horn. It is a switch and lock combined and the lock is a Yale. The central knob of the device controls the lights and is of the kick type. It is stated that the lights may be locked in any of the various combinations.



A. A. A. FORD CAPS.

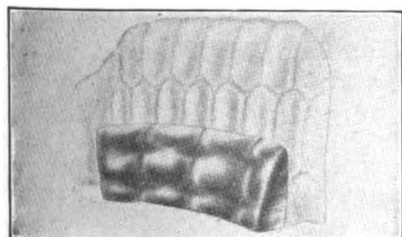
The A. Auto Appliance Company, 114 West Exchange



street, Providence, R. I., is marketing two designs of radiator caps for the model T Ford car, one a plain style, and the other with an initial. One of the qualities of the designs is that they are cast, not stamped. They are constructed of bronze and aluminum, and have scalloped edges, which not only add to the attractiveness of the design, but facilitate removal and replacement. Two finishes are supplied, polished nickel and black and nickel.

EASYBAK CUSHION.

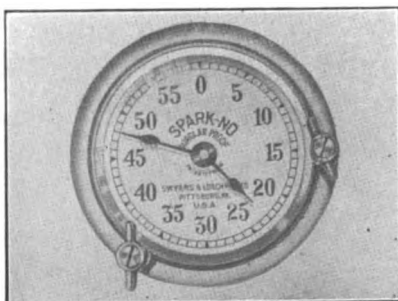
The Easybak cushion, marketed by the Holden Manufacturing Company, St. Paul, Minn., is constructed to support the back, thereby eliminating the strain upon the muscles when operating the clutch and brake pedals, as well as when undertaking long drives. The device is also of value to other occupants of the car. The Easybak fills the vacant space, and, supporting as it does the entire back, permits one to sit with the muscles relaxed even when



traversing rough roads. It is made of a strong water proof fabric in a dark gray or subdued brown to match the slip covers and in imitation or genuine leather. It is stated that the design will fit all makes of cars. It is moderately priced.

SPARK-NO LOCK.

The H. W. Johns-Manville Company, New York City, is marketing the Spark-No automobile lock, an ingenious device for locking the ignition system of the machine and preventing the use of the car by others than those intended. It is attached to the dash and the hands shown in the accompanying illustration are moved over a calibrated



dial by means of two little knobs. These are employed for starting on the battery and running on the magneto, and one of the qualities of the device is that it is impossible for any one riding with the driver to discover the starting combination. The action of the device is similar to a combination lock, but differs in that the combination operates a switch, and this switch cannot be closed to obtain current unless the hands are properly set on the dial. If any one attempts to steal the machine, not only is the ignition cut out, preventing starting of the motor, but an alarm is sounded by a bell. The signal is also sounded if any one tampers with the lock. The device is easily installed.

SECURITY ENAMEL.

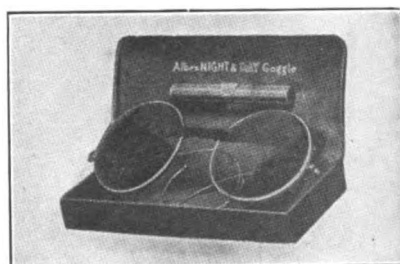
The D. Henry Bonner Company, Cambridge, Mass., is mar-



keting Security tire enamel, which is a specially prepared liquid paint made from a pure rubber combined with selected pigments. It is employed for protecting and preserving tires, mats and other rubber articles exposed to the action of the weather. The maker claims it will fill cuts, preventing moisture penetrating to the fabric, etc. When applied it dries quickly, imparting a beautiful gray appearance.

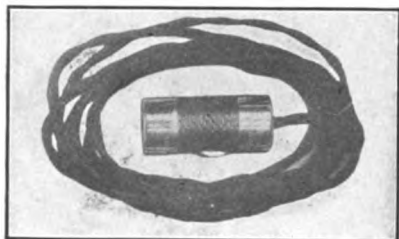
WILSON GOGGLES.

T. A. Wilson & Co., Inc., Reading, Penn., is marketing the Night and Day goggle, which includes provision for eliminating the glare created when meeting cars equipped with powerful headlights. It possesses the desirable features of a day goggle and, in addition, has an extra segment in the top of each lens. The smaller or lower section is of light amber, and the vision through this portion is for ordinary driving. The top lens is dark amber in color.



CENTURY LIGHTER.

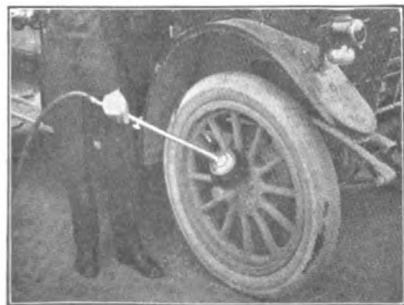
The Century cigar lighter is marketed by Mabey's Electric &



Manufacturing Company, Indianapolis, Ind., and is designed to operate on a six-volt storage battery or dry cells. The switch is of the push type, and included with the equipment is seven feet of silk cord. The dimensions of the lighter are one by two inches. It is finished in black leather, with all trimmings nickel plated. The company recommends running the cord from the battery up through the floor at the back of the front seat so the lighter will be convenient for all passengers.

HICKS BRUSH.

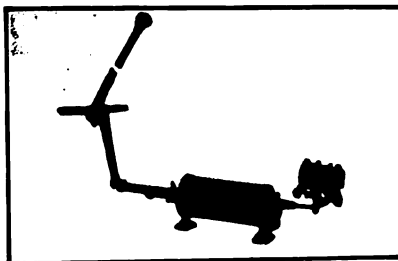
The Howard W. Hicks Brush Company, Denver, Col., is marketing the Hicks fountain brush, designed for owners who wash their cars. One of the qualities of the brush is that the washing may be accomplished without the operator wetting his hands or clothing. The brush parts are made of aluminum, the handle is of steel and 18 inches long; it is equipped with a rub-



ber grip. The connection is standard, permitting of attachment by means of a cut-out.

LIEBSON STARTER.

The Liebson Self-Starter Company, Macon, Ga., is manufacturing a mechanical type of motor starter which weighs less than 10 pounds and is stated to be applicable to any make of gasoline car. It differs from conventional types in that it is operated by compression and explosion, the principle involved being practically the same as that of an internal combustion engine. A lever operates a small pump, to which is attached a specially constructed carburet-

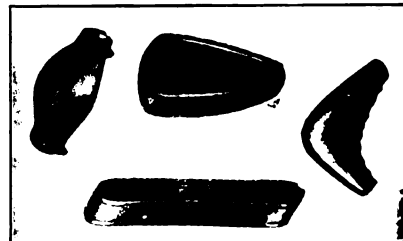


or. Moving the lever backward draws fuel into the pump, and at the completion of the suction stroke the proper amount of air is mixed with the gasoline. Another movement of the lever forces the mixture into a distributor having as many outlets as there are cylinders. An arrangement of valves actuated by cams makes for proper distribution of the gas, which is ignited by an electric spark. A feature of the starter is that in forcing the charge into the cylinder there is sufficient pressure to start the crankshaft revolving, and the ignition is so timed that the explosion takes place after this movement has begun.

In selecting accessories, tools, supplies or fittings, always consult The Buyers' Guide, found elsewhere in this issue. The concerns listed are thoroughly reliable and worthy of your confidence.

LATIGO FAN BELT.

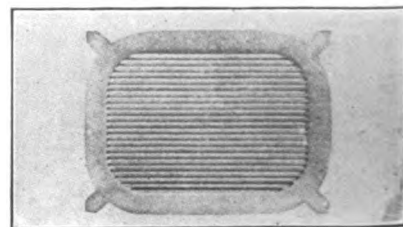
The Perkins-Campbell Company, 626 Broadway, Cincinnati,



O., manufacturer of specialties for the Ford car, is producing the Latigo fan belt. It is constructed of genuine Latigo leather, which contains no mineral or material employed in tanning. It is claimed to be the strongest leather known and impervious to the action of heat, oils or water. Special emphasis is laid upon its non-stretching qualities. The boots marketed by the company for the steering linkage of the Ford machine come in sets of three. They are constructed of the best grade of water proof leather, and are of the lace type.

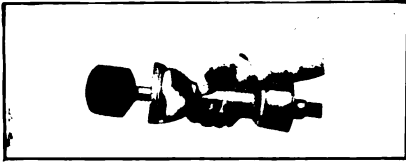
PYRMA HEEL PLATES.

The Metallic Automobile Matting Company, Rochester, N. Y., is manufacturing the Pyrma aluminum heel plates for the model T Ford car. One of the qualities of the design is that the use of screws, rivets, etc., is eliminated when attaching the plates to the matting. The Pyrma is fitted with corners, which are inserted in slits in the matting and bent to clinch the last-named material.



WIZARD WASHER.

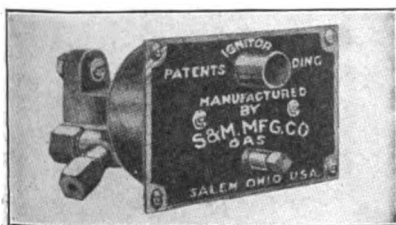
The Wizard washer, made by the Century Foundry Company,



Syracuse, N. Y., is designed to enable the owner to wash the car without rubber boots, aprons, etc. One of the qualities of the washer is that the hands do not come in contact with the water. A ball bearing turbine motor forces the water through a nozzle and around a rapidly rotating brush, so that all deposits are removed from the machine without injury to its finish.

S. & M. LIGHTER.

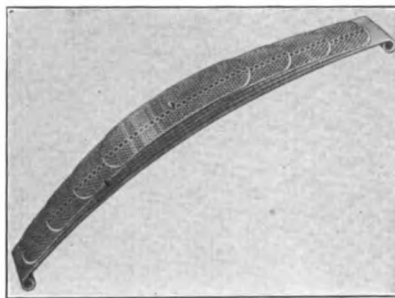
The S. & M. gas lighting equipment, marketed by the S. & M. Manufacturing Company, Salem, O., is an electrical device for controlling the lights from the seat. The gas is turned on at the dash, a diaphragm regulator preventing it from being turned on too high, by controlling the pressure from the tank. Ignition of the gas is effected by an electrical circuit, which starts at the rear spark plug and runs to one terminal of the controlling valve switch. From the other terminal a wire is led to the right hand burner, which is wired across to the other headlight and grounded. Special burners are necessary with the S. & M. lighter,



and are included with each equipment.

DANN SPRING INSERT.

The Dann Oil Cushion Spring Company, 2246 Indiana avenue, Chicago, is marketing the Dann oil cushion spring insert, which insures constant lubrication of the leaves. As will be noted by the accompanying illustration, the insert is provided with a large number of apertures, which are filled with a lubricant. Being inserted between the conventional leaves the latter are always lubricated, and one of the qualities of the design is that the insert will provide lubrication for a considerable period. It is pointed out by the



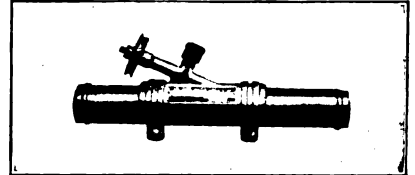
maker that an ordinary spring having a number of leaves of graduated lengths contains an enormous area of surfaces, which means that considerable friction is present if the surfaces are not constantly lubricated. The Dann insert provides this desired lubrication, eliminating squeaks as well as minor vibrations. It is easily installed.

TOURING EQUIPMENT.

The following concerns issue free catalogues, which will be of decided value in selecting practical, as well as useful equipment for the tour: The Walte Auto Supply Company, 81 Exchange place, Providence, R. I.; Alsten & Goulding, Worcester, Mass.; BI-Motor Equipment Company, 182 Massachusetts avenue, Boston; Auto Parts Company, 50 Exchange place, Providence, R. I., and the American Auto Supply Company, 1741 Broadway, New York City. The catalogues are well illustrated.

KERN CIRCULATOR.

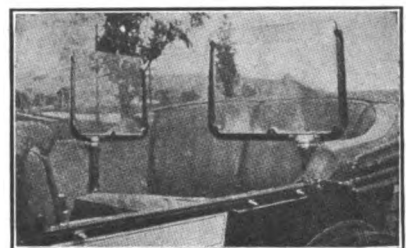
The Kern water circulator, made by the Pittsburg Manufac-



turing Company, Pittsburg, Penn., is designed for the model T Ford motor to augment the flow of the cooling fluid. The device comprises a simple propeller incorporated in the lower pipe shown in the accompanying illustration. The propeller is actuated by a pulley driven by a belt. It is estimated that the device will circulate eight gallons at 500 revolutions a minute and 18 gallons at 1100.

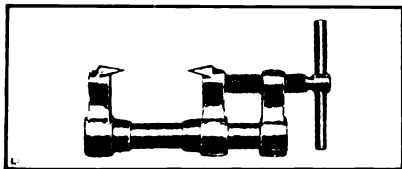
CLARK WINDSHIELD.

A. N. Clark & Son, Plainville, Conn., is manufacturing the Clark adjustable tonneau windshield and, as the name implies, is designed to protect the occupants of the rear seats from draughts, rain, etc. One of its qualities is that it may be adjusted as desired, and another feature is that it may be folded when its service is not required, as in warm weather. It is made with a variety of bases to fit any car, and is attached to the seat under the cushion, coming up between the seat arm and the cushion. One windshield is used on either side of the machine as shown herewith.



SPRING SPREADER.

Chas. E. Miller, 97-103 Reade street, New York City, is mar-



keting the Knowlson spring-leaf spreader, which is easily operated and adjustable to any size of spring. One of the qualities of the device emphasized is that it is not necessary to loosen the spring clips. To use it, the points are inserted between the leaves and the screw member is rotated. This forces the leaves apart, enabling the introduction of the lubricant. A feature of the tool is that it can be employed to make a temporary repair to a broken spring. It is moderately priced.

DOVER MEASURE.

Among the specialties marketed by the Dover Stamping & Manufacturing Company, Cambridge, Mass., is the Dover Duplex combination measure and funnel, which possesses several practical features, the most noticeable of which is a pouring lip with a centre channel. This permits of pouring fast and in quantities. It also has a funnel, which points slightly upward, so that when the measure is set down all lubricant runs back into it instead of outside; this construction makes



for economy. The handle is placed on the side for convenience in pouring. Like all Dover measures, it is of correct capacity and conforms with the laws of the various states.

NYCO SWITCH.

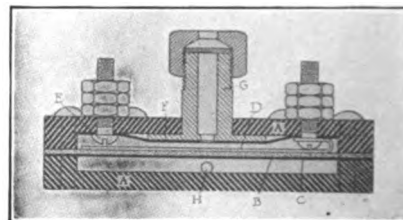
The New York Coil Company, 340 Pearl street, New York City, manufacturer of ignition apparatus, including devices for the model T Ford car, is marketing the Nyco two-system switch for the machines equipped with a master vibrator. One of the qualities of the Nyco is that the conventional coil may be utilized without removing the means for shunting the primary circuit. With the



Nyco the switch or controller may be moved to the vibrator side or to the coil side as desired. In the latter position the regular coil is brought into service. This is a distinct advantage, in that it permits the operator to use the vibrators to locate a missing or faulty cylinder. The lever or controller is of the conventional kick type, easily operated. The Nyco is supplied with flexible wire connections of different colors and of proper length to connect to the master vibrator and those of the coil. The wiring of the car is not changed and the Nyco may be fitted to the dash and wired in 10 minutes by the most inexperienced person. The device is compact and is constructed of high-grade material.

PRICE SWITCH.

An ingenious device for preventing the operation of the



electric horn or lighting system when the motor is not operating is the Price automatic cut-out switch. It utilizes the pressure or suction of the intake manifold to actuate it. As will be noted by the accompanying illustration, it is a simple electric switch operated by the suction referred to, and the switch is closed when the motor is operating. When the engine stops the electrical circuit is interrupted.

CARBONOX.

The Northwestern Chemical Company, Marietta, O., is marketing a carbon remover called Carbonox, a fluid which is injected into the cylinders. The preparation does not dissolve the carbon, but attacks the charred oil that holds the flakes of carbon to each other and to the cylinder, piston head, etc. One of the qualities of Carbonox is that it provides an inexpensive method of keeping the cylinders free from carbon, as it costs but a few cents a cylinder.



AMERICAN CARS AT DISADVANTAGE.**Poor Positions for Makers of Nationalities Not Represented in I. U. A. M.**

In order to secure space at the coming Paris salon, on an equal footing with automobile manufacturers in other countries, American makers must join in a body the International Union of Automobile Manufacturers, nations not included in the same being allowed spaces in the gallery only. French and other European exhibitors will draw lots for the good positions at the salon. America has never become a member of the union.

The automobile salon will open on Oct. 16 under President Poincaré's auspices and will close 10 days later. Space applications are said to be received until July 10.

SPEDOLENE.**Lubricant Prepared Especially for Gears, Transmissions, Differentials, Timing Gears, Etc.**

Spedolene is termed "The Lubricant That Kills Heat", by its maker, the Continental Asbestos Corporation, Worcester, Mass. It is designed especially for gears, transmissions, differentials, timing gears, bearings, etc., and is a mineral compound, containing no animal matter, fats, acids, lye, soda or water. It is non-corrosive. Spedolene is made from the finest grades of material, and each process of manufacture is carefully and thoroughly tested. Absolute uniformity is guaranteed. The maker states that it positively eliminates gear noises, does not run or throw out of the housings, and will give maximum service under all conditions. It is adaptable for pleasure and commercial vehicles.

DEALERS WIN SEPARATOR CASE.**New York City Council Favors Elimination of Ordinance Requiring Equipment.**

Because of expert opinion obtained by the New York City dealers to the effect that oil separators as prescribed for use in garages by the municipal code are of very slight value, the welfare committee of the City Council reported favorably on the resolution of New York dealers and repairmen that the section providing for the use of these appliances be eliminated.

This decision gained by the Gotham trade is due in a large measure to the work of Charles

Thaddeus Terry, who waged the fight for the New York Garage Association, the Automobile Dealers' Association of New York City, the Brooklyn Garage Owners Board of Trade, the American Automobile Association and the Brooklyn Motor Vehicle Dealers' Association.

GAME ON WILLYS-OVERLAND DAY.**All Employees Get a Half Holiday to See Athletics and Cubs Play.**

On Overland Day, which John North Willys gave to his employees on June 23, he engaged both the regular teams of Athletics and Cubs to play an exhibition game before the 10,000 workers. Each team received \$2000; \$500 was paid for the park and a full day's wages to all the workers, though they got a half holiday. Headed by Mr. Willys, the 10,000 men marched from the factory to Swayne field, where the game was played. The score was: Cubs, 8; Athletics, 7.

BIG DEMAND FOR ROADSTERS.**Empire Company Forced to Change Schedule Because of Large Call for Open Cars.**

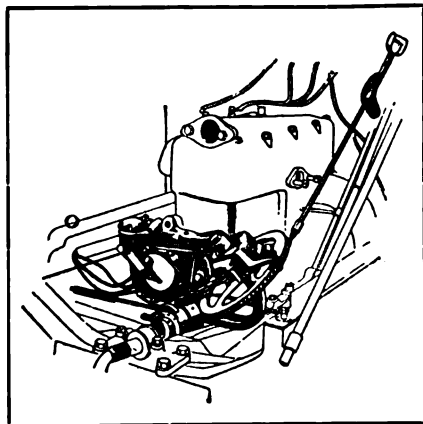
According to Cecil E. Gibson, general manager of the Empire Automobile Company, Indianapolis, a most notable feature of this season is an unprecedented demand for roadsters. Although anticipating a landslide in favor of this type of car and regulating its schedule accordingly, the above-named company has been forced to change its production scheme several times to meet the unusually great demand for the two-seater type of car.

SELECTING A MOTOR CAR.**National Motor Vehicle Company Tells How to Do It in a Neat Booklet.**

"How to Select a Motor Car" is the title of a neat little booklet just published by the National Motor Vehicle Company, Indianapolis, Ind. The text matter has been prepared with a view to presenting such information about National cars as will enable the prospective owner to make his selection wisely, and is well illustrated with photographic reproductions of the various models produced by this concern. Special chapters are devoted to the matters of comfort, performance, reliability, speed, the meaning of the name, etc.

SMALL CAR MOTOR STARTING SYSTEMS.

DURING the past six months a number of motor starting systems for the model T Ford have been placed upon the market, these in-



Boston Starter Installed.

cluding electric, mechanical and those operated by compressed air. The low initial cost, ease of installation and minimum attention required with the mechanical types has made them popular with the owners of the Ford machine. The starting of the engine from the seat appeals to the owners of this type of car, and those contemplating the purchase of a motor starter will find the following descriptions, of different types, of interest:

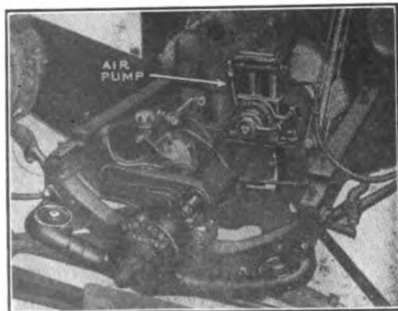
Boston.

The Boston starter, marketed by the Automatic Appliance Company, 172 Columbus avenue, Boston, is of the mechanical type and is operated from the seat by a convenient handle. One of the qualities of the design is that it starts the motor with the same certainty as though the crank were spun. Another feature of the design is that it does not interfere with the operation of the usual starting crank. Damage to the starter mechanism and motor is prevented by an automatic release, and as a further precaution the spark is automatically retarded.

The maker states that the Boston can be installed easily and without interfering with or changing the appearance of the machine, as the equipment, with the exception of the starting handle, is fitted under the hood. The handle is connected with the starter mechanism by cable, as will be noted by referring to the accompanying illustration, which depicts the simplicity of the design. Due to the leverage obtained the motor is spun easily.

Universal.

The Universal is a mechanical type and is marketed by the Universal Manufacturing Company, Racine, Wis. It is a simple design, very efficient and practical, and is easily installed without necessitating any alterations on the car. The starter mechanism proper is attached to the crankshaft of the motor in such manner that it does not interfere with the cranking of the engine by the usual starting crank, which is not disturbed.



Kellogg Air Starter.

Considerable energy is imparted to the crankshaft by the Universal and the maker states that a child can spin the shaft easily, as but a slight pull of the starting handle is required. The last-named member is fitted in the toeboard, convenient to the operator. The Universal includes a device for preventing injury to the motor or other mechanism in the event of a back fire. One of the qualities of the starter is that it may be installed in a short time and the equipment is most complete. The maker guarantees the Universal to turn the motor past the compression and firing stroke every time.

Kellogg.

The motor starter produced by the Kellogg Manufacturing Company, Rochester, N. Y., employs compressed air and comprises in combination a pump and starting mechanism, storage tank, gauge, starter button and pump control. The system installed is shown in an accompanying illustration.

The unit comprises a cylinder, the piston of which is actuated by air entering from tank. A chain connected

with the piston operates a drum in the housing mounted at the front of the car. This chain makes one complete turn around the drum. The fan-belt pulley is replaced with a combination pulley sprocket for driving the pump and a clutch which automatically engages with the motor when the starter is operated. The application of the air is gradual, but the power developed during the balance of the piston travel is sufficient to spin the motor. A spring returns the drum, preparing for a second application of energy. Control of the pump for storing compressed air is by a button and a similar member operates the starter.



Showing Starting Handle of Universal.

The application of the air is gradual, but the power developed during the balance of the piston travel is sufficient to spin the motor. A spring returns the drum, preparing for a second application of energy. Control of the pump for storing compressed air is by a button and a similar member operates the starter.

Housel.

The Housel starter, manufactured by the Century Foundry Company, Inc., Syracuse, N. Y., is of the mechanical type and is operated by depressing a pedal. Pushing the pedal actuates a flexible steel cable connecting with the starter mechanism, causing the crankshaft of the motor to be rotated rapidly. The cable runs through roller bearing pulleys, and the maker states that their arrangement is such as to obtain a downward pull, providing great leverage. Danger of damage to the mechanism or motor by a backfire is automatically eliminated. The Housel is mounted back of the radiator, is easily installed, and permits of the use of the ordinary starting crank.

Perfection.

The Perfection Auto Starter Company, Denver, Col. is manufacturing the Perfection, which is a mechanical design, operated by a pedal. Provision is made to prevent injury by a backfire of the motor.

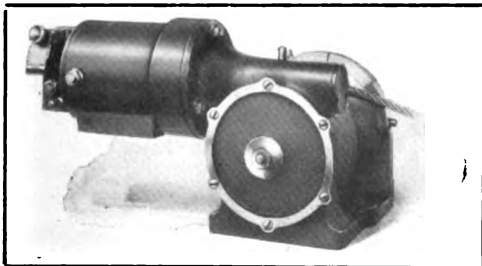
FEATURES OF HARTFORD ELECTRIC BRAKE.

A SMALL Hartford electric reversible motor, with a worm and worm wheel attached to a drum connected by a steel cable to the equalizer arm, constitutes the new electric brake of the Hartford Suspension Company, Jersey City, N. J. This invention of Edward V. Hartford is



Edward V. Hartford, the Inventor of the Hartford Electric Brake Giving a Push Button Stop.

controlled by a two-point switch encased and secured to the steering post. If the control lever is moved to the first point the motor is supplied from the battery with enough energy for service braking, while pushing the lever to the second point draws more electricity and brings about an emergency stop. The motor is series-wound and draws current from a six, 12 or 24-volt battery. It takes 40 amperes in two-fifths second to produce a pull of 1000 pounds. When running idle the motor turns at 10,000 rpm. The worm at the end of the armature shaft drives a gearing operating the drum which carries the steel cable, and the reduction between worm and gear is 100:1, and between the latter and the internal gear of the drum 4:1, giving a total ratio of 400:1. The cable transmits the pull directly to the brake. The motor is capable of applying 1000 pounds pull as quickly as through the emergency lever. This pull exerted, a slipping clutch prevents further pull and a ratchet the slipping off of the brake. Because of the intensity of the cable pull, the emergency brakes,



The Small Motor and Cable Drum, Weighing Only 35 Pounds, Can Be Mounted Wherever Desired.

If the control lever is moved to the first point the motor is supplied from the battery with enough energy for service braking,

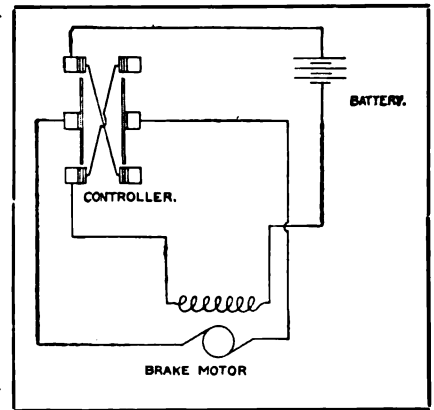
which the cable operates, are run in oil; thus the application of brakes must squeeze

a film of oil from between the brake shoes and drums so that the car is slowed down and the brake becomes more effective as the oil is displaced from between the contacting parts.

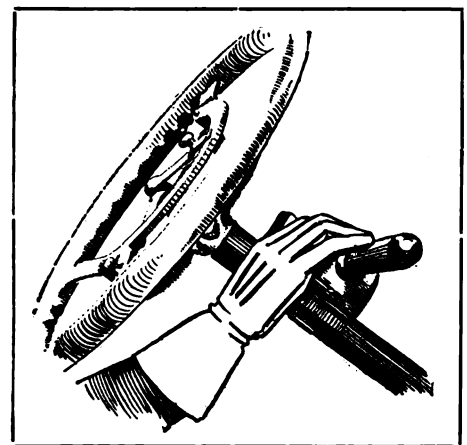
The inventor states that he can drive a car at 50 miles an hour up to 35 feet of a right angle turn, taking the latter at 15 miles. One of the most important advantages of the new brake is that as its effect is gradual, it slows down a car on a wet pavement without locking the wheels and causing the automobile to skid. This alone is a very strong point in the favor of the new device.

By connecting the Hartford brake to the emergency set, the foot brake is left for the driver's use as before. But the installation on the car of a device which can be depended on for practically infallible action provided the battery is charged, is a very valuable addition to the equipment, reduces the car's chances of accident and lends a feeling of security to driver and passengers. The device weighs 35 pounds, or indeed less, as the emergency lever and part of the linkage may be removed after its installation.

The high standard maintained in other Hartford products characterizes this brake.



The Method of Connecting the Hartford Brake to the Battery Is Extremely Simple, as Here Shown.



The Control of the Hartford Electric Brake Is by Means of a Two-Point Switch Control Encased and Attached in Any Position Suiting the Driver.

DUESENBERG WINS SIOUX CITY SWEEPSTAKES.

Rickenbacher Covers 300 Miles at 78.6 Miles an Hour—Wishart a Close Second—Nine American Cars and One French Car Finish.

AFTER driving steadily for 3:49:02, Eddie Rickenbacher, in his Duesenberg racer, finished first in the Sioux City 300-mile sweepstakes, having averaged 78.6 miles an hour on the local two-mile dirt track. Spencer Wishart in his Mercer was a close second, Cyrus Patschke in a Marmon was third and Gil Anderson's Stutz fourth. Billy Knipper's Delage, fifth, the winner of this year's Indianapolis sweepstakes, was the only foreign machine which finished. Ralph Mulford, having relieved Tommy Alley, was sixth in another Duesenberg; the Gray Fox, driven by Wilcox, was seventh. Chandler in a Braender Bulldog, Shrunk in a White and Wetmore in a Chalmers followed in the order named. There was a total field of 17 starters, 11 cars being American and six foreign; all but one of the latter dropped out, while all the American cars with one single exception finished.

With the 75th lap (150 miles) completed, the race was reduced to a speed duel between Rickenbacher and Wishart, who took the lead alternately, the final winner gaining on the turns, which he took at full speed, while the New York millionaire overtook him on the straightaways. When separated by a very small lead at the completion of the 286th mile, Eddie Rickenbacher was discovered to be four laps ahead of Wishart,

the correction being made by Fred A. Wagner, who had started the race and now superintended the timing. This discovery naturally placed victory in the hands of Rickenbacher, who finished with "eclat", as the French call it, by exploding a tire while crossing the tape. Wishart, who had intended to give the Duesenberg a hard tussle on the last seven laps, protested against the decision, claiming the time was not kept correctly. Other car owners followed his example.

When the starting gun was fired, Bob Burman jumped to the lead in his Peugeot and succeeded in holding this position for more than 20 miles. Then, when Wishart had gained on him and was a close follower, the French car was crippled for a very short time, sufficient, however, to let Wishart assume first place. In the meantime, Mulford, who was driving another Peugeot, tried to pass Wishart, but never succeeded for a single second. Rickenbacher kept behind the Mercer, getting acquainted with the course in all its details and gauging the field, against which he won afterward. At the same time, Patschke and Knipper took desperate chances on the turns, but never got above third position, save for an instant when Wishart had stopped, at the completion of 90 laps, to replenish his water and fuel supply. Then Knipper over-

took him, only to be reduced again to third place when the Mercer re-entered the course and renewed its fight against the Duesenberg. Once more, after 190 laps were completed, it looked as though he might still take the lead, but a stop for water during the 171st lap eliminated his chance.

For a time it seemed as though the other Duesenberg might win. Between the 60th and 75th lap, Tommy Alley held first position, but he could not keep up the pace, and with 150 miles completed, he dropped to third, Wishart leading Rickenbacher by one mile. Pushed by



Rickenbacher and His Duesenberg, the Combination That Won at Sioux City.

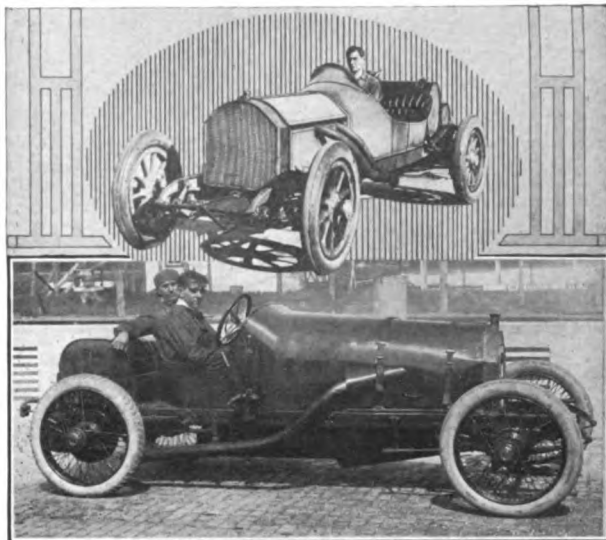
Patschke and Knipper, Alley soon was reduced to sixth position. When the leaders had circled the course for the 100th time, many of the drivers in back positions retired, as they saw no chance of winning, leaving at one time only nine cars on the track. Then several cars were disabled, but when the finish came into sight, several machines returned to the track and at the close there were 10 automobiles in the race, each of which received a share of the prize.

A total of \$25,000 had been hung up, and Rickenbacher got \$10,000, while the rest was distributed among the other drivers, who had stayed in the race. Including the winner, seven cars were timed for the entire 300 miles, the time being as follows:

Car	Driver	Time
Duesenberg	Rickenbacher	3:49:02
Mercer	Wishart	3:49:50
Marmon	Patschke	4:02:10
Stutz	Anderson	4:02:56
Delage	Knipper	4:03:34
Duesenberg	Alley and Mulford	4:31:07
Gray Fox	Wilcox	4:42:32

This order, however, was arrived at only after 18 hours' deliberation and conference by the board of officials, due to the threat of several owners of complaining to the A. A. A. Originally, Mulford's Duesenberg car was timed to have finished third, Patschke had been fifth and Knipper sixth. Naturally, the managers of the local speedway association were much disappointed that any misunderstanding should have arisen concerning the timing, as the officials had been selected on account of their past experience in similar contests.

The Peugeot cars, which had been expected to make a good showing, dropped out relatively early. Mulford's car had its oiling system broken after 32 miles; Stringer's machine was disabled by a crash through the fence, its engine dying just when the car shot towards the judges' stand; Burman dropped out after having covered more



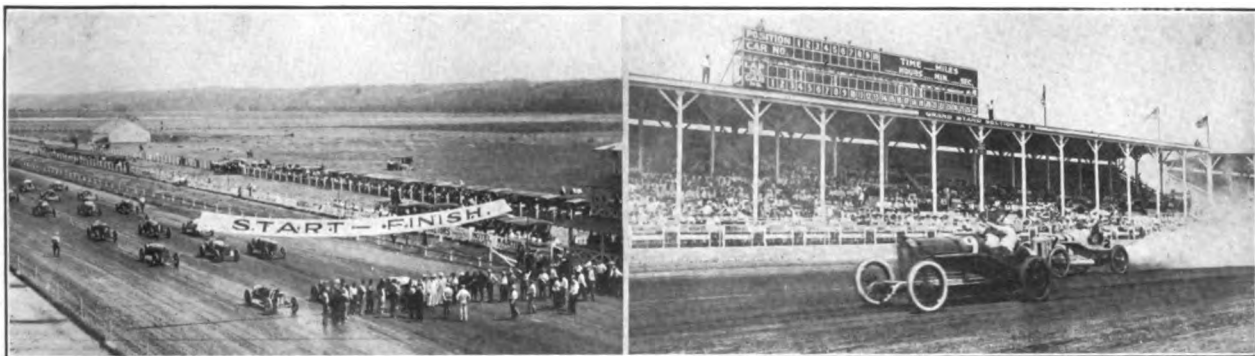
Top—Cyrus Patschke and His Marmon, Which Finished Third. Bottom—Spencer Wishart, Who Was Second by a Close Margin.

than half the distance of the race. Mulford relieved Alley when the latter was seriously burned by gasoline catching fire while his tank was being replenished. All other accidents were slight.

Oldfield's Stutz, which had its radiator broken, and Babcock's Sunbeam, suffering breakage of a valve, forced these two competitors out of the race. Wetmore, a local driver, continued to drive his Chalmers after it had gone wrong, and he finished 10th, succumbing to the heat after the race was over.

To the great disappointment of the spectators, a Moon car, driven by Ely Caillouette, and two Chevrolets, steered by Le Cain and Jessop, respectively, which were claimed not to have been timed correctly in preliminaries the day before the race, were disqualified because their trial lap times were from five to seven seconds too slow.

On July 3, the day before the race, throngs of Iowa and South Dakota enthusiasts reached



Lining up the Competing Cars Before Sending Them Away. (Left). Burman Passes Shrunk—One of the Many Thrills of the Race. (Right.)

Sioux City by train and automobile. Many cars were driven up to the course on the eve of the race to assure the owners of good positions for the event. The following morning several hundred cars were driven into the oval parking space for automobiles. When the gates were thrown open to the public at 7 a. m., Independence Day, the multitude made a rush for the grandstand and all other points of vantage. The attendance was considerably in excess of what had been expected; according to a statement of the speedway association, 47,000 persons had paid to view the race.

Equipment Utilized.

All of the cars that started in the race were fitted with Bosch magnetos, and Bosch spark plugs were used by all save two of the 10 machines that won places and prizes. Rayfield carburetors were equipment on Spencer Wishart's

SAXON REACHES SAN FRANCISCO.

Small Car Finishes Coast-to-Coast Run on Independence Day, Averaging 30 Miles a Gallon.

After a final burst of speed whereby the Lincoln highway Saxon small car covered the 290 miles between Reno, Nev., and San Francisco in two days, the transcontinental tourists reached the latter city, into which they were paraded by an escort party that had travelled out 25 miles to meet the little machine. Thus the trip of 3389 miles was completed on schedule time. The Saxon is the first automobile which travelled over the Lincoln route from one end to the other, maintaining its schedule exactly, while its path led over roads and hills of every kind and grade. M. A. Croker and Fred Wilkins drove alternately. The total consumption of fuel was 113 gal-

lons, giving 30 miles to a gallon of gasoline, while the oil consumption was one quart for 150 miles of travel.

For 30 consecutive days before the start on the transcontinental trip, the Saxon car was driven 135 miles a day in Detroit, giving a total travel of 4050 miles, which, together with the 3389 miles of the Lincoln highway trip, aggregate 7439 miles, which were covered in 60 days. Upon reaching San Francisco Driver Croker drove the front wheels of the Saxon into the Pacific ocean so as to make the trip literally an ocean-to-ocean run. He also emptied water, carried from the Atlantic, into the Pacific.

FISK REDUCES TIRE PRICES.

The Fisk Rubber Company, Chicopee Falls, Mass., on July 1 reduced the prices of tires of certain sizes. The reduction applies to all sizes of non-skid tires, but on the plain tread tires to the three and 3½-inch sizes only, while there is no change in the price of tubes. The increase in non-skid tire production during the past two months was 200 per cent.

Following is a tabulation giving a comparison of the old and new prices:

Tread	New Price	Old Price
30x3½ plain	\$16.55	\$17.00
30x3 plain	12.30	13.85
34x4 non-skid	31.60	36.60
36x4½ non-skid	42.65	46.35



Transcontinental Saxon Completes Tour from Atlantic to Pacific Ocean, a Distance of 3389 Miles—The Machine Is Shown Dipping Its Wheels in the Atlantic Ocean at the Start.

Mercer, as well as three other cars that were given places. The Marmon, Stutz and Chalmers cars that finished fourth, fifth and 10th, were lubricated with Monogram oil. Castor oil was used by eight cars.

Wire wheels were general equipment of many of the cars. Rudge-Whitworth wheels were on the cars finishing first, second and third, and Houk wheels on the car making fourth position. The Houk wheels are manufactured by the Geo. W. Houk Company, Buffalo, N. Y., under license from the Rudge-Whitworth Company, and differ in name only from the English production.

The promoters of the race were so well satisfied with the result that they purpose to make a purse of \$50,000 to be competed for July 4, 1915, and to improve the course, either by resurfacing or banking it.

METZ MAKES CLEAN SWEEP IN HILL CLIMB.

IT WOULD appear that the Metz Company, Waltham, Mass., is to capture the hill-climbing championship for 1914, judging from the performance of the Metz "22" in recent events. The latest victory to be scored by the gearless transmission machine of but 196 inches piston displacement, was a clean sweep of the second annual hill climb conducted by the Utica Automobile Club at Richfield Springs, N. Y., July 4. The Metz finished, one, two, three, both in the class A and free-for-all, making better time than any other car competing in the seven events.

The performance is all the more remarkable when it is considered that the Metz defeated a field of 12 cars, including several high-powered machines noted for their hill-climbing abilities. Some idea of the speed may be obtained from the time of 55½ seconds on a grade seven-eighths of a mile long. The other Metz entries in the free-for-all finished a second apart and the third car was but two seconds behind the winner. The time made by John Guiney was five seconds better than the best made by any other machine, excepting the Metz entries.

In class A, in which the Metz finished one, two, three, Arthur Roder was the winner in 1:05. with Guiney second in 1:07¼ and C. Walter Metz third in 1:09 2-5.

G. M. Francis, driving an Overland, won the class C in 1:10, while Stuart Foster and B. Roberts won first and second places in class E with Mercer cars. Foster finished third in the free-for-all, which was a clean sweep for the Metz entries.

A feature of the motorcycle events was the breaking of the amateur record for the hill by Howard Ainsworth of Utica, N. Y., who covered the grade in 55¾ seconds. Silver trophy cups were awarded the winners. The events, cars and drivers are as follows:

Class A—Won by Arthur Roder, Metz, time, 1:05; second, John Guiney, Metz, time, 1:07¼; third, C. Walter Metz, time, 1:09 2/5.

Class B—Won by Edwin J. Adams, Chevrolet, time, 1:13¼; second, H. C. Dalker, Maxwell, time, 1:14½; third, C. G. Senif, Maxwell, 1:17¾.

Class C—Won by G. M. Francis, Overland, time, 1:10; second, W. R. Hitchcock, Page-Detroit, time, 1:19; third, A. P. Howarth, Regal, time, 1:25¼.

Class D—Won by H. W. Skinner, Chandler, time, 1:09¼; second, F. E. Henabray, Oakland, time, 1:09½; third, Dr. H. M. Clapp, Cole and C. O. Jones, Cadillac, 1:13.

Class E—Won by Stuart Foster, Mercer, time, 1:00½; second, B. Roberts, Mercer, time, 1:03½.

Class F—H. W. Skinner, Chalmers, time, 1:00¾; second, Charles W. Gorton, Pope-Hartford, time, 1:06½.

In the motorcycle races, Walter J. Baird won

the single-cylinder event in 1:55. The race for twin-cylinder machines was won by H. Jefferson in 0:53¾, and the free-for-all by Stewart J. Baird in 0:56.

OIL PROVES EFFICIENT.

Salt Lake City Motorist Uses No-Karbon Eagleline Lubricant in 14-Mile Hill Climb.

Operating the motor for long periods on grades, necessitating recourse to the low and second speeds, is a severe test of the efficiency of the lubricant utilized. The Eagle Oil & Supply Company, 104 Broad street, Boston, Mass., received recently an unsolicited testimonial from a user of No-Karbon Eagleline auto oil.

C. R. Pearsall of Salt Lake City wrote the company as follows:

Some people think that your No-Karbon oil is too thin to be effective. I drove my car, a three-year-old model X Stevens-Duryea, up a 14-mile incline that has a very steady grade, amounting to 4800 feet in the 14 miles. It was moderately warm, but the water did not boil, nor did I lose a drop. I do not know of any other instance of any motorist in the city making the same trip without being compelled to replenish his supply of water from two to 50 times during the climb. I do not cite this believing that the oil was entirely responsible, as I know my motor is particularly well cooled, but it proves that No-Karbon oil does lubricate in the most trying circumstances, and some have doubted this.

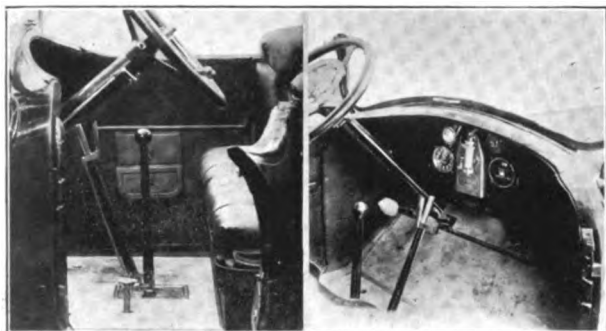
TOURING EQUIPMENT.

Waite Auto Supply Company Offers Numerous Practical Accessories, Supplies, Fittings, Etc.

One of the best known automobile supply houses in New England is the Waite Auto Supply Company, 81 Exchange place, Providence, R. I. Motorists planning tours will find there many useful and practical accessories providing comfort and convenience, as well as material necessary in fitting the car for the road, including everything from a cotter pin to a power tire pump, etc. The company is distributor for Rayfield carburetors, Klaxon horns, Mea magnetos and many other well known products. In addition the Waite Auto Supply Company manufactures staple accessories, such as the Success dry cells, spark plugs, etc. The catalogue issued free by this concern is most complete, including as it does illustrations and descriptions of supplies, fittings, accessories and a full line of touring equipment.

MARMON'S POINTS: BODY AND EQUIPMENT.

WITH few mechanical changes, but very much amplified in its accessory equipment and considerably refined in details of many



Driver's Compartment, Showing Left Steer and Centre Control.

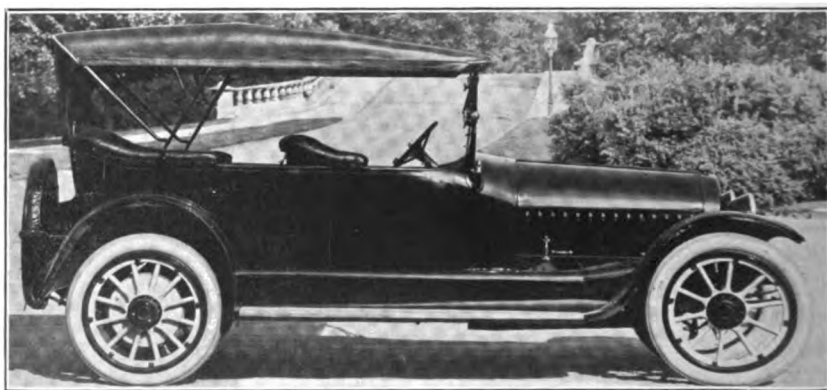
parts of the car, the Nordyke & Marmon Company, Indianapolis, Ind., offers its model 41 to the American public. Perhaps the most significant innovation is the introduction of a complete electrical Bosch equipment, consisting of three units, the lighting generator, the cranking motor and the magneto. The generator begins to operate at 12 miles an hour, and at once gives enough electricity to illumine all the lamps. The surplus current charges a Bosch-LBA storage battery of 50 ampere-hours capacity at 12 volts. The cranker is a 12-volt, series wound motor. The generator supplies the current required by head, side and tail lights, as well as the trouble hunting lamp, besides charging the battery for starting the motor. In starting, the generator supplies the ignition current, until the motor begins to operate, when the magneto cuts in and the cranker stops work. Also, if it becomes necessary to start by hand, the engagement of the starting crank automatically switches on the battery ignition, and after the motor has started, the magneto is switched on.

Excepting the minor changes necessitated by the new electrical equipment, the motor is the same as before, 4.25 by 5.5 inches, the cylinders being cast in two blocks of three. The pistons are slightly different this year; they are 5.453125 inches long and fitted with three compression

rings, all above the wristpin. The upper rings are concentric packing rings and the lowest a concentric oil ring with nine .125-inch holes drilled around the circumference at an angle of 45 degrees. The carburetor is a Stromberg type connected to a strangling and air adjustment on the steering column. Gasoline is fed by suction in the intake pipe to the auxiliary tank, whence it flows to the carburetor by gravity. The oil pressure is obtained by means of a gear driven pump in the bottom of the oil sump below the crankcase and driven off the camshaft. Another innovation is the casting separately of the case enclosing the timing gears and bolting it to the front end of the crankcase instead of casting it integrally with it. This permits more exact machining and absolute uniformity and alignment of the motor in the frame.

By locating the water pump below the fan, greater compactness is obtained and the need of running the magneto drive shaft through the pump overcome. Two chains drive this shaft, instead of one, giving more silent operation. The rear motor support carries the cranking motor.

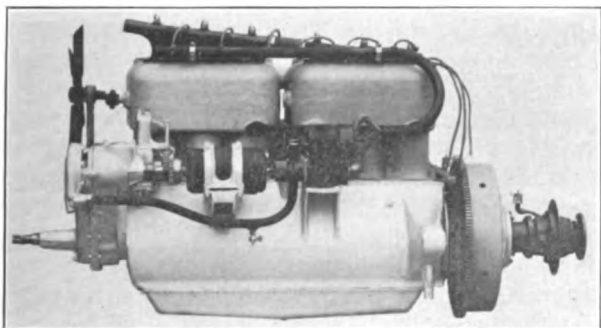
The clutch is a cone type faced with Thermoid. Instead of placing the spring under the facing, five steel plates within the flywheel itself serve to engage the clutch easily. The three-speed selective transmission is mounted amidships at three points. The gears are made 3.5 per cent. nickel steel, the shafts of carbon chrome steel, tempered in oil; the gearshift lever slides on ball bearings, ensuring easy operation.



Exterior of Model 41 Marmon Six, with Streamlines, Plain Running Board, Rounded Radiator, Windshield Secured to Cowl, One-Man Top Attached to It and Spare Tire Carried in the Rear of the Car.

The drive shaft has a universal joint at each end; another one is situated between the clutch and gearbox, making a total of three joints.

Two sets of brakes, external contracting service and internal expanding emergency, are mounted on the rear wheels and faced with



Left Side of Motor on Which Magneto and Generator Are Carried.

asbestos. The latter is now of the cam instead of the toggle operated type.

The car has 132.5 inches wheelbase and the wheels are shod with 36x4.5-inch Goodrich Silvertown Cord tires. The suspension consists of three-quarter elliptic springs in the rear and semi-elliptic in front, where Truffault-Hartford shock absorbers are used.

A great deal of work has been done in making the body specially fine in appearance and this object has been realized by the use of streamlines, sloping hood, crowned fenders and a rounded radiator. The front doors open toward the forward edge, to give extra ventilation. The deep, soft upholstery is tufted more widely than before and the sides of the body are made higher. The body itself is of sheet steel. The graceful curve of the front mudguards sways into the straight, free running board, tools, etc., having been stored under the front seat and in other suitable portions of the body.

A one-man top has been introduced and is attached to the windshield when open. The shield has its pane divided for rain vision and ventilation purposes. Rods extending through the cowl of the body to its base support the shield, which is held underneath the cowl by a strong casting.

All models of the Marmon 41 are fully equipped with starting and lighting system, Warner speedometer, Hartford tire pump, one-man top, windshield and the complete line of accessories which the Nordyke & Marmon Company decided

this year are necessary to the operator of a high-class automobile. There are five models of the model 41 being offered to the public—a seven-passenger touring car, which lists at \$3350, while the five-passenger touring type, the four-passenger model, the speedster and the roadster model are all sold for the standard price of \$3250.

TOURING ABROAD.

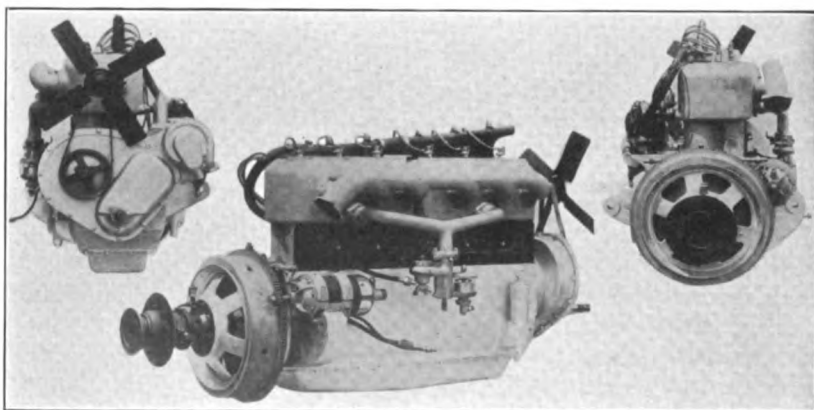
Interesting Information Relative to Motoring on the Continent.

Wallace Nutting, who has a nation wide reputation as an artist, and who is especially well known in the New England states, writes of motor conditions on the Continent, where he and his party have been touring in a Stevens-Duryea for several months.

He emphasizes the fact that the tourist of the present time does not need to encounter the difficulties and annoying experiences that a few years ago seemed almost inevitable. Arrangements can be made to place the car in the hands of a high-class customs' broker at Boston or New York, who will attend to all matters.

As is commonly known, the roads on the Continent are generally in good repair. Tourists should not light the headlights in Paris. To do this is almost certain to cause arrest, but no one is ever arrested for speeding in or out of that city. Owing to the great speed of so many automobiles it is necessary to drive very cautiously. Mr. Nutting writes at the close of a recent letter:

You will be pleased to know that we have not spent

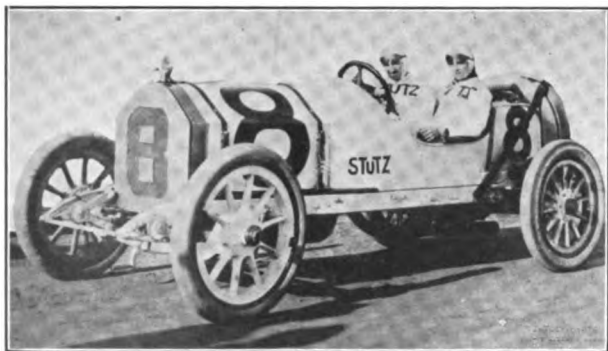


Right or Carburetor Side of Marmon Power Plant, with Both Manifolds and Cranking Motor Visible; Also Front End of Motor Showing Water Pump Mounting and Rear End Illustrating the Flywheel and Novel Clutch.

a cent on our car since leaving America. We have toured Italy and France, so far making 4500 miles, and after careful examination of the mechanism can find nothing to do, as it runs like silk, and not a nut or a screw loose.

STUTZ AND MAXWELL, TACOMA WINNERS.

EARL Cooper, driving a Stutz, was the most brilliant star in the Montamarathon speed festival, held at Tacoma, Wash., on July 4, win-



Earl Cooper in Stutz Won the 250-Mile Race.

ning as he did the 250-mile Montamarathon trophy race in 3:24:34.8, and finishing 12 miles ahead of the next car.

No less splendid work was done by Hughey Hughes, who on the day before won the Potlatch

Klein by 1:49.4. Besides these three drivers, Parsons in the Frantz and Taylor in the Alco were the only ones who finished out of 14 starters.

On July 3 the Intercity 100-mile race was run first and the trophy was taken by Parsons in the Frantz, who obtained, by this victory, which repeated his feat of last year, permanent possession of the Perpetual Challenge trophy of the Tacoma Automobile Club, together with a substantial sum of money. The Ray car, driven by Brock, finished 10 minutes later than the winner, Latta's Lozier followed after 1:10.8, with Staley's Studebaker fourth after a further 7:04.2. Croston's Chevrolet and Smyley's Hupmobile finished fifth and sixth respectively, but were not timed.

The second event of the first day was the 200-mile race, won by Hughey Hughes, who displayed more speed in his Maxwell than any other driver during the speed carnival, averaging 74.28 miles an hour. His wonderful performance and the gallant display of Klein, the driver of the King Oriole, constituted perhaps the finest racing spectacle ever beheld on the western coast.

CARS AND DRIVERS THAT FINISHED IN THREE RACES, AND THEIR TIMES.

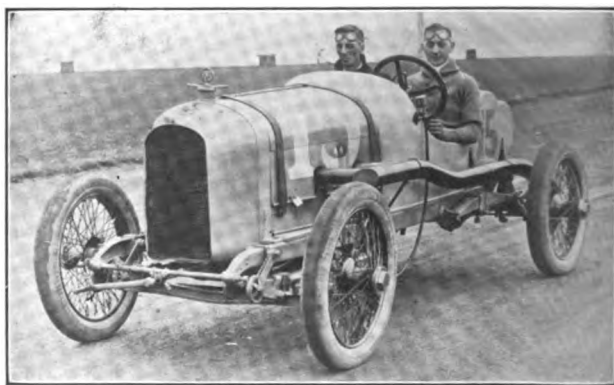
POTLACH—200 MILES.			MONTAMARATHON—250 MILES.			INTERCITY—100 MILES.		
CAR	DRIVER	TIME	CAR	DRIVER	TIME	CAR	DRIVER	TIME
Maxwell ...	Hughes.....	2:41:32.4	Stutz	Cooper.....	3:22:34.8	Frantz	Parsons.....	1:21:29.4
King	Klein.....	2:41:36.8	Mercer ...	Ruckstall...	3:32:33.8	Ray	Brock.....	1:31:22.4
Stutz	Cooper.....	2:44:01.4	King	Klein.....	3:34:22.2	Lozier	Latta.....	1:32:33.2
Ono	Dingley.....	2:50:13.6	Frantz ...	Parsons.....	3:45:20.2	Studebaker	Staley.....	1:39:37.4
Mercer	Ruckstall.....		Alco	Taylor.....	4:17:12	Chevrolet	Croston.....	
Frantz	Parsons.....					Hupmobile	Smyley.....	

trophy in the 200-mile event in 2:41:32.4, driving at even greater speed than Cooper did in the longer race, and defeating Arthur King in the Klein by 4.4 seconds, or 160 feet. On July 3 the Intercity trophy was also raced for, and Parsons, in a Frantz, covered the 100 miles in 1:21:29.4.

Cooper's Clear Victory.

During the Montamarathon race, Cooper, from the very start, drove at such speed that when he had circled the two-mile speedway for the 42nd time, his victory seemed assured. Indeed, he never had his lead cut down by any of the other cars; interest, therefore, was directed toward these, and the contest between Ruckstall in the Mercer, Klein in the King and Dingley in the Ono, made the onlookers hold their breath until the last-named car overturned during the 124th of the 125 laps of the race. Dingley was slightly ahead of the other two when his car dropped out. In the meantime, Cooper had held his lead of 8:01 over Ruckstall, who in turn led

Hughes' time broke the 1913 record, established by Cooper, 71.07 miles an hour. The possession of the Challenge trophy and a prize of \$1500 were Hughes' reward. Earl Cooper was third, less than three minutes behind Klein, and Dingley came in 6:12.2 after Cooper.



Arthur Klein in King Did Splendid Work.

MERCEDES WINS THE GRAND PRIX.

Lautenschlager First in French Classic—Averages 65.54 Miles an Hour for 467.6 Miles—Germans Second and Third.

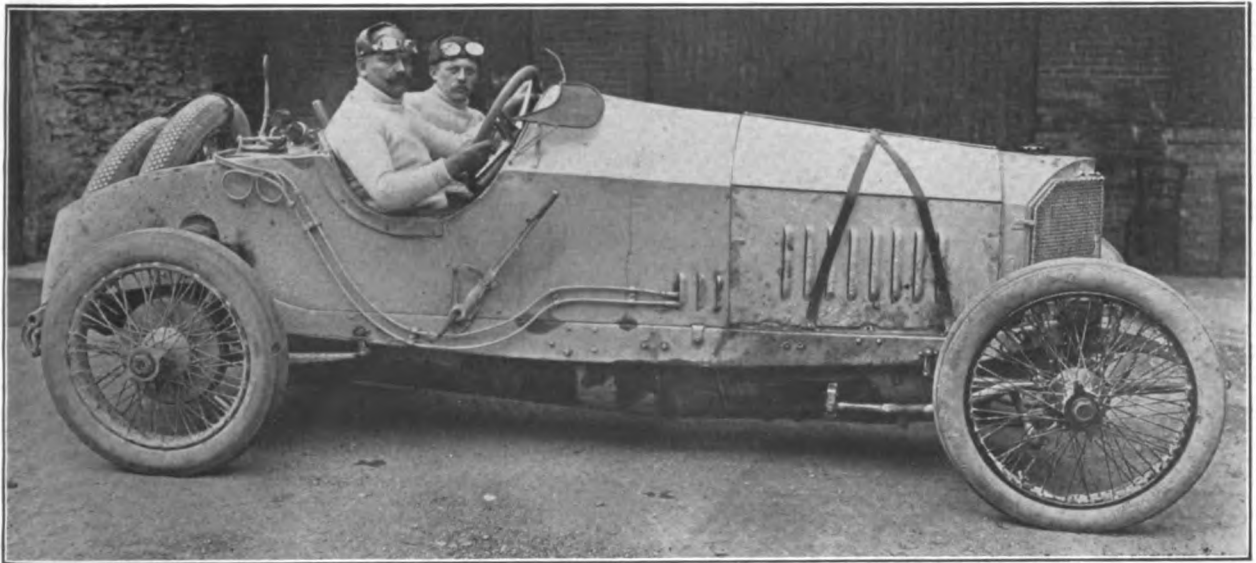
HAVING covered the 467.6 miles of the Lyons circuit in 20 laps, the Mercedes, driven by Lautenschlager, finished first in the race for the Grand Prix of the Automobile Club of France, after a running time of seven hours, one minute, 18.5 seconds, Wagner and Salzer being second and third respectively, in machines of the same manufacture, while Jules Goux, the winner of the 1913 Indianapolis 500-mile race, was fourth in a Peugeot car.

The Grand Prix was a most brilliant event this year, 41 cars making up the list of starters. Among these were 12 French machines, 11 Ital-

hour having been attained repeatedly in preliminary work, the shape of the track is such that few expected a higher average speed than 70 miles per hour to be made by the winner of the event. As a matter of fact, Lautenschlager's average time was 66.54 miles per hour.

Lautenschlager's Mercedes was equipped with detachable wire wheels, two of which were carried in a special open compartment in the rear of the seats. This arrangement made speedy tire changes easy.

Wagner's Mercedes, which came second, ran for 7:09:54, making its average running speed



Lautenschlager, the Driver of the Winning Mercedes, as He Appeared Before Starting in the Race for the Grand Prix of the Automobile Club de France.

ian, eight German, six English, two Belgian and two Swiss. Following were the makes represented: Delage, Peugeot, Alda, Th. Schneider, Mercedes, Opel, Sunbeam, Vauxhall, Nazzaro, Fiat, Aquila-Italiana, Piccard-Pictet and Nagant. Among the drivers popular in America were De Palma and Pilette, as well as Duray, Boillot and Chassagne, well known as Indianapolis contenders.

The Lyons circuit is triangular and has a total length of 23.5 miles. While some portions of the course allow very high speed, 105 miles an

65.4 miles an hour, and Salzer's Mercedes was timed 7:13:15, averaging 64.8 miles.

HOUK'S NEW YORK MANAGER.

The George W. Houk Company of Buffalo, N. Y., announces the appointment of H. M. Kiesewetter, formerly of the Michelin Tire Company, as advertising manager and manager of its New York branch, located at northeast corner of 58th street and Broadway, whence all Houk wire wheel business in greater New York is handled.

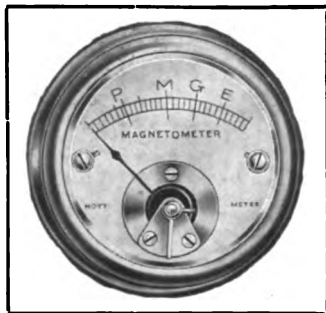
PRIZE OF \$10,000 FOR AMERICAN CARS.

United States Drivers to Be Encouraged—San Antonio Club Offers Prize.

To stimulate the interest of American manufacturers in racing, and to prevent a repetition of the victory scored by Europe in the last Indianapolis 500-mile race, the San Antonio, Tex., Auto Club, has inaugurated a movement for the establishment of a national \$10,000 trophy, to be offered the next American car winning the event.

HOYT MAGNETOMETER.

The Hoyt Electrical Instrument Works, Penacook, N. H., maker of the well known Hoyt meters, is marketing the Hoyt magnetometer, shown herewith. The device was designed expressly for the model T Ford car and is connected in circuit with the flywheel magneto for the purpose of indicating the condition of the current



Hoyt Ford Magnetometer.

generator. As will be noted by the illustration, the dial of the magnetometer is calibrated, the letters P, M, G and E, representing poor, medium, good and excellent respectively. With one of these compact little instruments it is possible to ascertain at a glance whether or not the magneto is operating efficiently, as well as its condition. It also saves time in locating ignition troubles credited to the magneto. The Hoyt Ford magnetometer is permanently attached to the dash, is but two inches in diameter and is inexpensive.

A PROGRESSIVE FIRM.

Remarkable Growth of Business of Alsten & Goulding Company, Worcester, Mass.

Indicative of what may be accomplished in the automobile industry is the remarkable growth of the Alsten & Goulding Company, Worcester, Mass., well known especially throughout central New England. This concern, consisting of J. A. Alsten and H. C. Goulding, began business in 1900 in a little store, 15 by 20 feet, devoting its efforts to bicycle repairing, mar-

keting supplies, etc. The owners foresaw the possibilities of the motor car and early engaged in repairing tires, and are stated to be the first concern in New England to vulcanize a single-tube tire. Today the vulcanizing plant of the Alsten & Goulding Company is one of the best in the country.

The present location of the company is not far from its original store, and today the entire block is devoted to accessories, parts and supplies, over 8000 feet of floor space being utilized. The company was incorporated in 1910 and is held to be the largest accessory concern in central New England. The territory covered includes Western Massachusetts, New Hampshire, Vermont, Northern Rhode Island, Connecticut and Maine. The catalogue issued is unusually complete, and the company is distributor for such well known lines as the Weed chains, Klaxon horns, Columbia dry cells, Rayfield carburetors, Michelin and Federal tires, etc.

ELLIS-WARD CO. TO HANDLE GAULOIS.

Two Men of Long Experience Will Open High-Class Tire Business.

The recently incorporated Ellis-Ward Company will handle the Gaulois tire in New England, temporary headquarters having been located at 817 Boylston street, Boston. Mr. Ellis, the president and manager of the concern, is among the best known men in the eastern field. As early as 1905 he was affiliated with the Angier company as manager of the Boylston street office, leaving it to become connected with Albert Champion, then an importer of spark plugs. Later on Mr. Ellis became sales manager of the Bi-Motor Equipment Company, leaving it to direct the sale of Batavia tires. Mr. Ward has been a member of the Seamless Rubber Company's sales department for several years.

The plan of the new company is to open one of the best equipped tire stores in the East, success being assured by the excellence of the product it handles and the broad acquaintanceship of its officers with the field.

Racing colors in the next Indianapolis 500-mile race, it is announced, will be uniform, so as to denote the nation which a car represents. German machines will thus be white, French blue, English green, Belgian yellow, Italian red, and American red and white.

KNOX MOTORS COMPANY FORMED.

H. C. Fisk and E. O. Sutton Head New Concern— Plant Operating Again.

Judge Morton, United States District Court of Massachusetts, has handed down a decision confirming the sale of the entire plant of the old Knox Automobile Company to the newly formed Knox Motors Company, Springfield, Mass., in the person of its treasurer, E. O. Sutton, who was one of the receivers of the old company, while H. C. Fisk was the other, and is now president of the Knox Motors Company. Mr. Fisk is widely known as the treasurer of the Fisk Rubber Company.

With the nucleus of a selling organization already formed in New York, Boston, Kansas City and Chicago, the Knox company possesses the most necessary channels for the distribution of

gave free public concerts in their respective parks, which enterprise met with the hearty appreciation of inhabitants everywhere. The accompanying photographs show the band, in which John North Willys takes great interest, with members uniformed and in working attire.

IGNITION SPECIALIST.

Motor Parts Company, Bosch Distributor, Maintains Efficient Service Department.

Specializing as it does in ignition apparatus, the Motor Parts Company, 182 Massachusetts avenue, Boston, official Bosch distributor, is exceptionally well qualified to give its customers prompt and efficient service. The company maintains a corps of ignition experts and is prepared to replace worn parts at short notice, as well as to correct ignition troubles. The labor-



Overland Band in Musicians' Uniforms.



Members of the Band in Working Attire.

its products, while the systematizing of the factory is already partially completed, so that production hereafter will be on a standardized basis.

Work has begun on the manufacture of a number of Knox-Martin tractors and several high-class dealers in various territories have applied for the agencies of the latest model touring cars, which are now practically ready for the market.

OVERLAND BAND TRAVELS SOUTH.

Trip Takes Workers to 18 Cities, Where They Give Public Concerts.

The Overland band, which consists of workmen employed in the factories of the Willys-Overland Company, accompanied the Rotary Club of Toledo, O., on its round trip through the South recently. The band visited 18 cities and

atories are equipped with the latest machinery and tools, enabling repairs, tests, etc., to be quickly made. The Motor Parts Company prides itself upon its service department, in which quality and efficiency are emphasized. The Motor Parts Company is distributor for a number of well known lines, such as the Zenith carburetor, Leak-Proof piston rings, Mohawk tires, Kemco fan type generator, etc.

NO LIGHTS ON FERRY BOATS.

Hereafter automobiles crossing the Hudson between New York City and Hoboken, N. J., on ferry boats owned by the Delaware, Lackawanna & Western Railroad Company, will not be allowed to be started or cranked until the boat has been made fast to the bridge. All lights of vehicles showing at the bow or stern of the boat must be extinguished or covered while crossing.

N. A. C. C. OPPOSES FREIGHT INCREASE.

THE National Automobile Chamber of Commerce, at a recent meeting of the official classification committee of the railroads held in New York City, opposed the following suggestions, which, if carried out, would increase automobile freight rates materially. One proposition relates to a projected packing requirement on polished sheet iron and steel, while the other is an effort to charge the weight of blocking used in fastening automobiles in freight cars at the rate applicable when a single automobile is shipped.

Strong opposition was made to the suggestion that polished sheet iron and steel, U. S. standard

Y., has purchased a Duplex driven Detroit electric car. The machine bought by Dr. Steinmetz is a stock model, equipped with wire wheels, full aluminum body, plate glass windows and patented double-ventilating, clear-vision windshield.

AUTOMOBILE EXPORTS INCREASED.

Most Industries Show a Falling Off When Compared with a Year Ago.

The exports of motor vehicles and parts have shown a consistent increase in valuation over last year, while most other articles manufactured ready for use show a marked falling off in exports and total exports for 10 months ended with April are \$59,000,000, or nearly 2.8 per cent. less than for the 10 months ended with April, 1913.

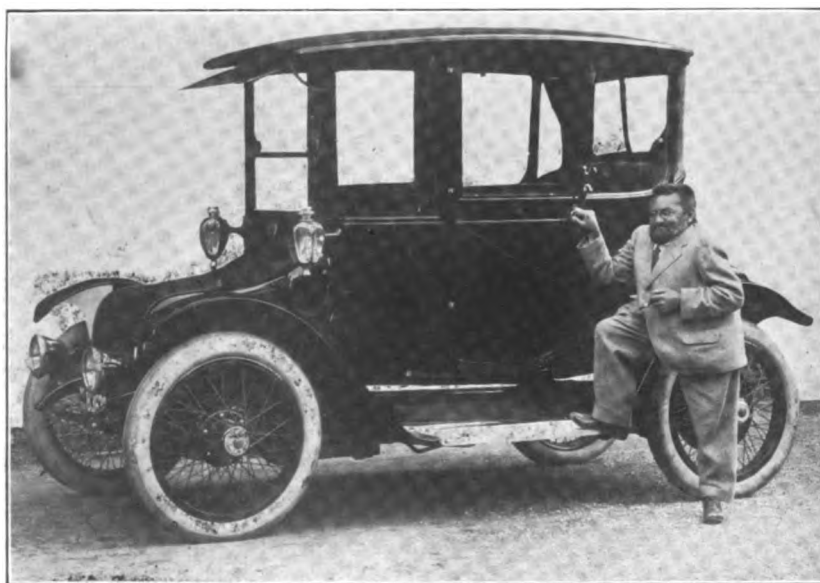
Most of the increases in exports have been in raw and partly manufactured materials. Only a few of the many articles exported ready for consumption show an increase. Among these are automobiles, motorcycles and aeroplanes.

Exports of wagons and carriages have fallen off 22 per cent., steam and electric railroad rolling stock 28 per cent., stationary, marine and other en-

gines, 32 per cent., motor boats 40 per cent., agricultural implements 17 per cent., all machinery and parts 10 per cent., breadstuffs 25 per cent., meat and dairy products two per cent. and wood and wood manufactures eight per cent.

MAXWELL PLANT FOR CHEVROLET.

The Chevrolet automobile will be manufactured at New York City and Tarrytown, N. Y., production being scheduled to begin about Jan. 1, 1915, according to W. C. Durant. Mr. Durant purchased the old Maxwell plant at the last-named locality a short time ago. The New York factory has a daily output of 20 Chevrolet cars, the Flint, Mich., factory makes 35 and the Tarrytown plant is to manufacture 50 a day.



Dr. Charles B. Steinmetz and His New Detroit Electric.

gauge No. 20 or thinner, must be packed in metal cases with wooden covers for shipment. The method of shipping this material has been to place a pile of sheets in each corner of a box car and hold them in place by proper arrangement of 2x4 timbers. If the railroads adopt the requirement that this material must be boxed for shipment, it is estimated that \$6 to \$8 per ton will be added to the cost to automobile manufacturers,

STEINMETZ BUYS DETROIT ELECTRIC.

Famous Engineer Selects Stock Model, Including Standard Equipment.

Dr. Charles B. Steinmetz, chief engineer of the General Electric Company, Schenectady, N.

LIABILITY INSURANCE ON TOUR.

The ever-imminent possibility of accident quite beyond the control of any driver from carelessness of others, lightning, or quick and unforeseen exigencies, has impelled most motor vehicle owners to insure against liability and property damage.

When accident happens, claims for injuries or damage to property of others are almost certain to be made, regardless of fault, and damages are often collected, too, for it is well established that the average jury is hostile to the owner of a car. Such damages are generally heavy, and prudent owners, cognizant of this fact, provide insurance that not only protects them against loss, but also relieves them of the necessity of employing counsel and defending suits.

When on tour the need of such protection is most cogent, for then it is that unfamiliar roads must be traversed, long runs made, and unusual hazards encountered. The Massachusetts Bonding and Insurance Company, 75-78 State street, Boston, Mass., a company organized and doing business under the rigid insurance laws of Massachusetts, with ample resources, with representatives in all sections of the United States, specializes liability and property damage protection. Its policies are especially broad and liberal. The recommendation is made to those who might be inclined to take chances ordinarily to protect themselves while making tours.

MODEL STREET CLEANING DISTRICT.

Motor Truck Club Indorses Suggestion of New York Commissioner.

At its last New York meeting the Motor Truck Club of America discussed the plan of Street Cleaning Commissioner Fetherston for the establishment of a model district in New York City and specially indorsed the plan regarding the organization of an expert technical staff to insure the formulation, installation and operation of an efficient system, to be carried out along scientific and businesslike lines.

CONVICTS FOR ROAD WORK.

Osborne to Advocate General Use of Prisoners for Highway Construction.

Due to the results of Thomas Mott Osborne's work in Auburn prison, New York, the national committee on prison labor will accentuate its con-

tention for convict road camps and farms. Mr. Osborne voluntarily served a sentence to encourage by his self-sacrifice the prisoners who have organized a Mutual Welfare League. Since organization of this league the men have largely become responsible for their own discipline and such are the results that Mr. Osborne is convinced open-air life would improve conditions.

HEADS Y. M. C. A. SCHOOL.

Frank G. Westwood Take Charge of Automobile Department of Well Known Institution.

When W. C. Hosford resigned as head of the automobile department of the Boston Y. M. C. A., Frank G. Westwood, formerly in charge of the institution's garage, took his place as superintendent. The appointment of Mr. Westwood is due principally to his executive ability and complete understanding of every detail of the school administration, and he has assisted hundreds of school graduates in solving intricate problems arising during their course at the school. He will carry out many plans which originated under the previous management.



Frank G. Westwood.

TREES FOR LINCOLN HIGHWAY.

The General Federation of Women's Clubs, Chicago, is working on a plan whereby the 3400 miles of the Lincoln highway are to be lined with trees and shrubs. Mrs. E. E. Kemble, heading the conservation committee of the federation, directs the raising of funds.

Walter E. Holland has been appointed manager of the mechanical and research department of the Anderson Electric Car Company, Detroit.

FLYING BOAT AMERICA LAUNCHED.

Rodman Wanamaker's Transatlantic Flier, Made by Curtiss, Is Fast and Strong.

The transatlantic flying boat America, built by Glenn H. Curtiss for Rodman Wanamaker, was christened and launched on Lake Keuka, near Hammondsport, N. Y., on June 23. The following day Mr. Curtiss, Lieutenant John C. Porte and George Hallett made successive trial flights which showed that the new machine is a fast and strong flyer. Before starting on her projected trip across the ocean, however, auxiliary planes will be attached to the side of the hull of the boat.

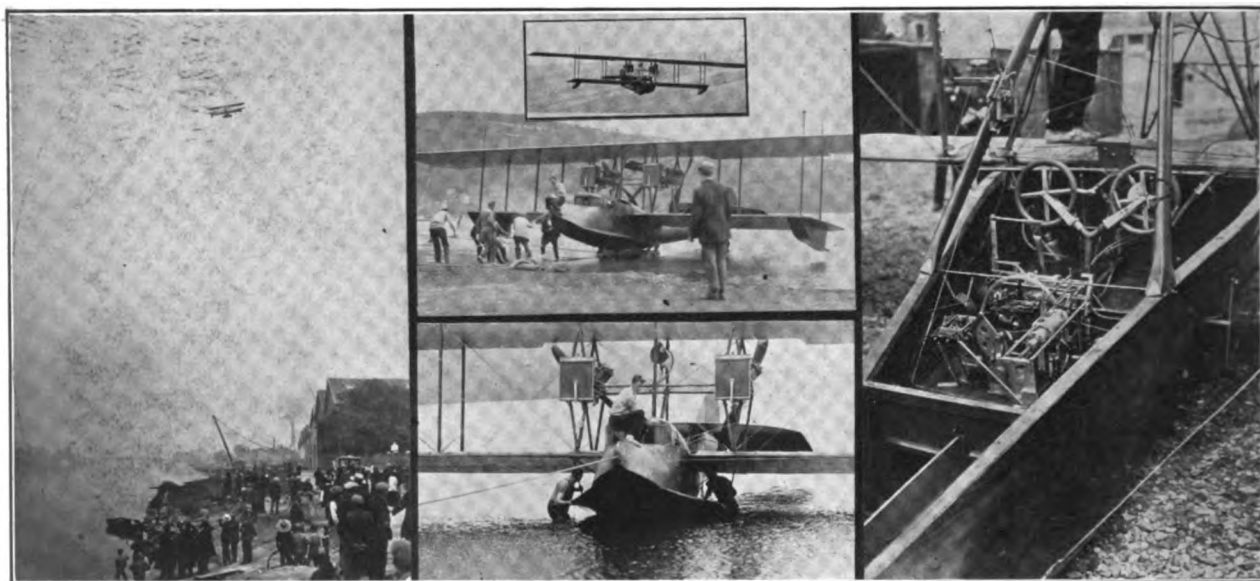
The hydroplane America is 34 feet long; the

capacity of 312 gallons of gasoline, stored in seven tanks; 30 gallons of lubricating oil may be carried.

SPERRY-CURTISS DEVICE WINS.

Stabilizer Awarded First Prize of \$10,000 for Automatic Stability.

America scored a victory in aviation when the Sperry Gyroscope Company, New York City, was awarded the first prize of \$10,000 for a device to secure automatic aeroplane stability, by the Concours de Securite, Paris. The Sperry-Curtiss stabilizer was installed on a Curtiss hydraeroplane and the demonstration was made at Bezons on the Seine before the judges' committee.



Recent Events in Aviation: At Left—Demonstrating the Efficiency of Sperry-Curtiss Stabilizer at Bezons; at Center—Testing Rodman Wanamaker's Curtiss Transatlantic Flying Boat "America"; at Right—Close View of Automatic Stabilizer Operated by High-Speed Gyroscopes.

length of the hull is 30, its width four and its depth six feet; the cabin is seven feet long, four feet wide and five feet high. The spread of the upper wing is 74 feet, of the lower 47 feet, the gap between both being $7\frac{1}{2}$ feet. The weight of the empty flyer is 3000 pounds; with full load it weighs 5000 pounds. The speed for which the hydroplane is designed is 62 to 65 miles an hour.

Power is supplied by two 90-100 horsepower Curtiss motors of the model O-X type, mounted midway between the planes at a distance of nine feet; each motor shaft carries a propeller. While designed to fly at a speed of less than 1000 rpm, the motor may attain a speed as high as 1300 rpm. The machine has a total fuel carrying ca-

The Sperry device consists of four small gyroscopes actuated by as many small electric motors, current for which is generated by a little dynamo driven by the aeroplane motor. The gyroscopes rotate at 12,000 rpm. A small foot lever throws the stabilizer into or out of action, and while operating, it is claimed that the machine is practically proof against overturning. During the demonstration ride, Lawrence Sperry, the 21-year-old son of the inventor, stood up in the seat and threw up his arms, while his assistant walked out upon the wing of the device. The machine immediately adjusted itself to the new distribution of weight. The judges' committee decided that the device was the most perfect existing.

Tarvia

*Preserves Roads
Prevents Dust~*



How tarviated roads reduce upkeep—

Esplanade, Brighton Ave. to Abbington
Blvd., Kansas City, Mo., Con-
structed with "Tarvia X".

ORDINARY macadam is surfaced with fine screening, the durability of which is necessarily slight. These particles are readily dislodged by traffic and are constantly shifting and rubbing, forming dust which is washed or blown away.

After a little time this surface disappears, exposing the lower layers of coarser stone. The large stone of the lower courses, thus exposed, shifts under the weight of traffic and the road then begins to ravel hopelessly and requires an expensive renewal.

These larger stones, if they could be held in posi-

tion, are capable of giving more wear than the fine stone of the surface.

One of the many economies of the Tarvia treatment is that it is so efficient a binder that it permits the use of large stone clear up to the wearing surface, screening being used merely to even up the surface for the sake of smoothness.

In this matrix of Tarvia the larger stones take the direct wear of traffic. They cannot shift, and the road grows smoother with use and eventually becomes a mosaic of great durability. Very little care or renewal work is needed on such a road. It will stand heavy traffic without producing dust or mud. It is clean and attractive at all seasons.

*If you are interested in the good roads proposition, write
for the free booklet covering the Tarvia treatment.*

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MAINE AUTOMOBILE ROAD BOOK.

The Maine Automobile Association, after a year's touring of all the highways of the Pine Tree State, has brought out its 1914 Automobile Road Book, in which 103 routes throughout the state are described with full detail, with right and left turns, intermediate mileage, land marks along the way, etc. Many splendid illustrations add to the value and interest of the work, which

has 352 pages and contains three new maps, showing the roads of Maine and most of New Hampshire. Furthermore, it gives a summary of Maine fish and game laws and forest fire requirements, as well as regulations for motorists entering Canada. The book is bound in cloth and is obtainable from the Touring Information Bureau, 12 Monument square, Portland, Me., on payment of a nominal charge, necessitated by the cost of preparing and printing the work.

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Motorists who visit this hotel once, invariably tell their friends that—
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Send two-cent stamp for illustrated pamphlet giving detailed description of various trips. Address L. G. Lewis, General Passenger Agent, Detroit, Mich.

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It Will Carry Extra
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Ones in the Lamps of
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The Hoyt Magnetometer

It is located on the dashboard and shows the strength of the magneto at all times when running. By keeping your magneto in shape more current is generated, a stronger spark may be produced, and combustion is greatly improved. This livens up the motor and cuts down fuel bills. No Ford car should be without this wonderful little instrument.

Write today for free booklet No. 8, describing Ford magneto and ignition troubles and remedies.

Price of Magnetometer \$4.00, at garages and hardware dealers.

Hoyt Electrical Instrument Works, Penacook, N. H.

(58-11)

Announcement of Importance to the Trade

International Cycle-Car and Accessories Company announces its organization as general distributors of cycle-cars, cycle-car parts, assemblies and accessories.

It announces the entering into an arrangement with Woods Mobilette Company for the general distribution of Woods Mobilettes---America's First Cycle-Car---and for the general distribution of such other cycle-car parts as Woods Mobilette Company will manufacture for the trade.

It will also handle cycle-car accessories, and correspondence from manufacturers of same is invited.

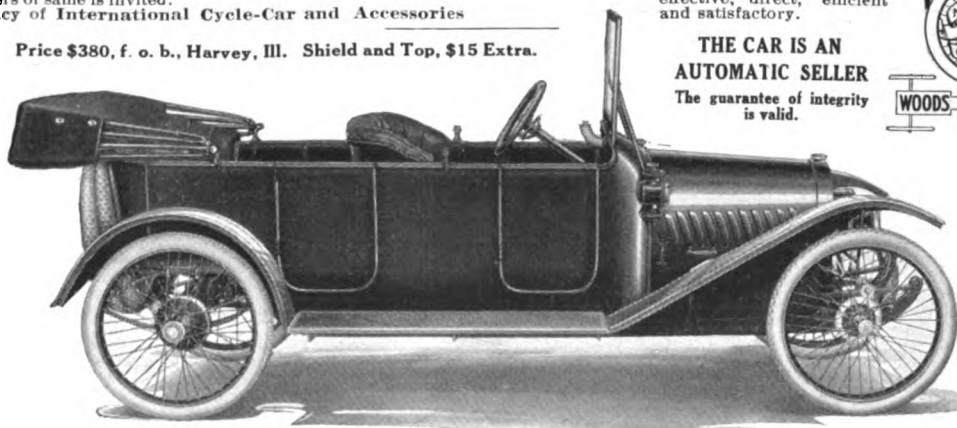
The policy of International Cycle-Car and Accessories

Company will be strictly one of dependable service. It will deal direct with each dealer, thus insuring to the manufacturers represented on the one hand and to the dealer and consumer on the other, a service that is at once economic, speedy, effective, direct, efficient and satisfactory.



Price \$380, f. o. b., Harvey, Ill. Shield and Top, \$15 Extra.

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AUTOMATIC SELLER
The guarantee of integrity
is valid.



Model No. 3.

WOODS MOBILETTE "AMERICA'S FIRST CYCLE-CAR."

Wheel Base, 102 in.; tread 36 in. Motor, Four Cylinder, 12 h. p., water-cooled. Transmission, Sliding gear type; two speeds forward and one reverse. Axles, Drop forged, 1850 lbs. capacity; rear axle full floating type. Every mechanical detail is of superior and proven worth.

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They are the cumulative result of our nine years' experience in the manufacture of dependable spring suspension.

No matter how hard you inflate your tires, our absorbers insure perfect resiliency and save half your present tire expense. Unnecessary wear and tear on motor, transmission and other components is eliminated because they reduce vibration to a minimum.

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For thirty days you can try them at our expense. J. H. S. are made for every known car.

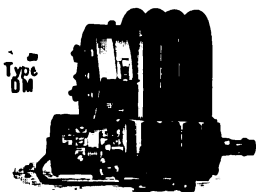
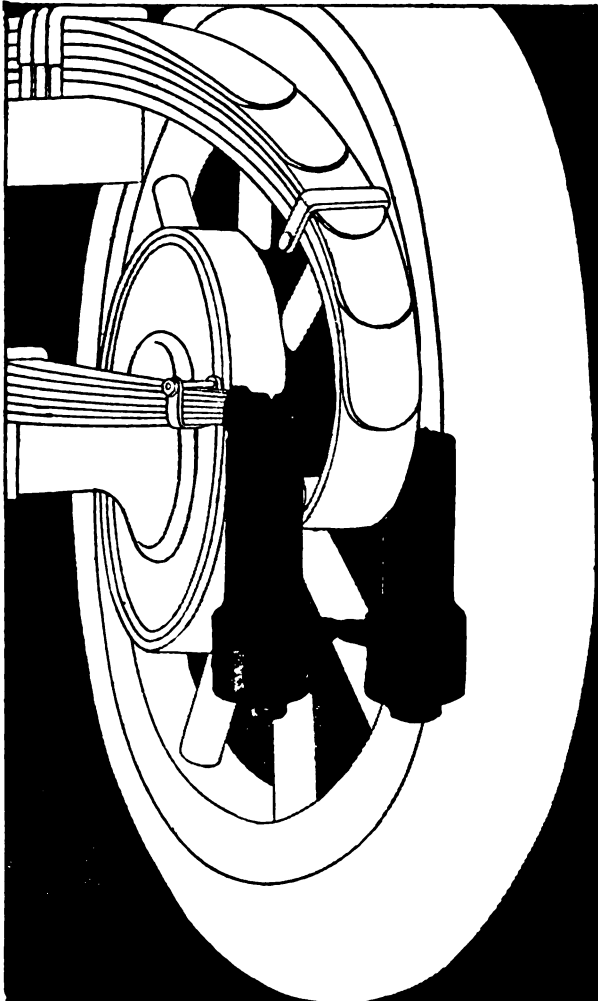
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"K-000 NON-FLUID OIL" is of proper consistency for use in compression cups on all bearings, for packing differential gears, steering gear knuckles, ball and roller bearings, etc. It lasts longer than any grease and is unaffected by temperature changes.

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9	10	11	12	13	14	
16	17	18	19	20	21	
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30	31					

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Cut down the days by half—

Use Valentine's Vanadium Quick Finishing Varnish, wherever quick work is an advantage. It dries out of dust in two hours and hard overnight.

It is especially valuable in hot weather, dusty weather, fly weather.

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The Vanadium Window Transparencies, in five colors, are now ready. Write us a line for a couple of them. Fine for window decoration.

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Motor Parts Co., 185-187 Columbus Ave., Boston; 818 No. Broad St., Philadelphia; Springfield, Mass.
Northwestern Chemical Co., Marietta, O.
Times Square Auto Co., 56th St., at Broadway, New York City.
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AUTOMOBILES. (See Cars.)

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R. I. V. Co., 1771 Broadway, New York. (R. I. V.)

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(Continued on Page 172.)

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Carry
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Does what its name indicates...tells you when your rear light fails to work and saves court fines.
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CARS—GASOLINE PLEASURE.

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Cole Motor Car Co., Indianapolis, Ind. (Cole.)
Empire Automobile Co., Indianapolis, Ind. (Empire, Little Aristocrat.)
Haynes Automobile Co., 166 Main St., Kokomo, Ind. (Haynes.)
Knox Motors Co., Springfield, Mass. (Knox.)
Lexington-Howard Co., Connersville, Ind. (Lexington and Howard.)
Maxwell Motor Co., Inc., Detroit. (Maxwell.)
Metz Company, Waltham, Mass. (Metz.)
Moline Automobile Co., E. Moline, Ill. (Moline.)
National Motor Vehicle Co., 1033 22nd St., Indianapolis. (National.)
Nordyke & Marmon Co., Indianapolis. (Marmon.)
Paige-Detroit Motor Car Co., Detroit. (Paige.)
Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)
Premier Motor Mfg. Co., Indianapolis, Ind. (Premier.)
Reo Motor Car Co., Lansing, Mich. (Reo.)
Salvador Motor Co., Farragut Bldg., Massachusetts Ave., Boston. (Salvador.)
Studebaker Corp., Detroit. (Studebaker.)
Stutz Motor Car Co., Indianapolis. (Stutz.)
Velle Motor Vehicle Co., Moline, Ill. (Velle.)
Willys-Overland Co., Toledo, O. (Overland.)
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Factories: Peekskill and Tarrytown, N. Y.
Palmer-Moore Co., Syracuse, N. Y. (Palmer-Moore.)
Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)
Reo Motor Car Co., Lansing, Mich. (Reo.)
Signal Motor Truck Co., Detroit. (Signal.)
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Velle Motor Vehicle Co., Moline, Ill. (Velle.)
Willys-Overland Co., Toledo, O. (Willys Utility and Garford.)

(Continued on Next Page.)

(BUYERS' GUIDE—Continued.)

CARS—ELECTRIC COMMERCIAL.

Baker Motor Vehicle Co., Cleveland, (Baker.)
Couple-Gear Freight-Wheel Co., 575 Buchanan St., Grand Rapids, Mich. (Couple-Gear.)
Branches: 30th floor, Singer Bldg., New York; 178 Devonshire St., Boston.
General Motors Truck Co., 26 Cadillac Ave., Pontiac, Mich. (GMC.)
Branches: See Cars—Gasoline Commercial.
General Vehicle Co., Long Island City, N. Y. (G. V.)

CARS—FIRE, POLICE AND MUNICIPAL SERVICE.

Cartercar Co., Pontiac, Mich. (Cartercar.)
Couple-Gear Freight-Wheel Co., 575 Buchanan St., Grand Rapids, Mich. (Couple-Gear.)
Branches: See Cars—Electric Commercial.
Knox Motors Co., Springfield, Mass. (Knox and Martin Tractor.)
Willys-Overland Co., Toledo, O. (Overland.)

CEMENTS.

Northwestern Chemical Co., Marietta, O. (Se-ment-ol Radiator.)
Rub-On Mfg. Co., 87-97 Brayton St., Buffalo, N. Y. (Sta-Fix Radiator Mend.)

CHAIN LUBRICANTS.

Motor Accessories, Inc., 749 A Boylston St., Boston. (Chain-Lub.)

CHAINS, TIRE, AND ANTI-SKIDDING DEVICES.

Weed Chain Tire Grip Co., 28 Moore St., New York.

CHAINS—TRANSMISSION OR DRIVING.

Boyd, F. Shirley, 903 Boylston St., Boston. (Baldwin.)

COILS.

Heinze Electric Co., Lowell, Mass.

CYLINDER CLEANING COMPOUND.

Bowling Green Sales Co., 80 Flatbush Ave., Brooklyn, N. Y. (Ball Carbon Remover.)
Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.
Milwaukee Auto Specialty Co., 705-711 Chestnut St., Milwaukee.
Northwestern Chemical Co., Marietta, O. (Carbonox.)
Prest-O-Lite Company, 226 Speedway, Indianapolis. (Prest-O-Carbon Remover.)
Branches: Atlanta, Baltimore, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Indianapolis, Jacksonville, Kansas City, Los Angeles, Milwaukee, Minneapolis, New York, Omaha, Philadelphia, Pittsburgh, Providence, San Francisco, Seattle, St. Louis and St. Paul.

DRESSING, TOP AND LEATHER.

Rub-On Mfg. Co., 87-97 Brayton St., Buffalo, N. Y.

ELECTRIC LIGHTING EQUIPMENT.

Culver-Stearns Mfg. Co., Worcester, Mass.; Detroit.

FAN BELTS.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

FIRE EXTINGUISHERS.

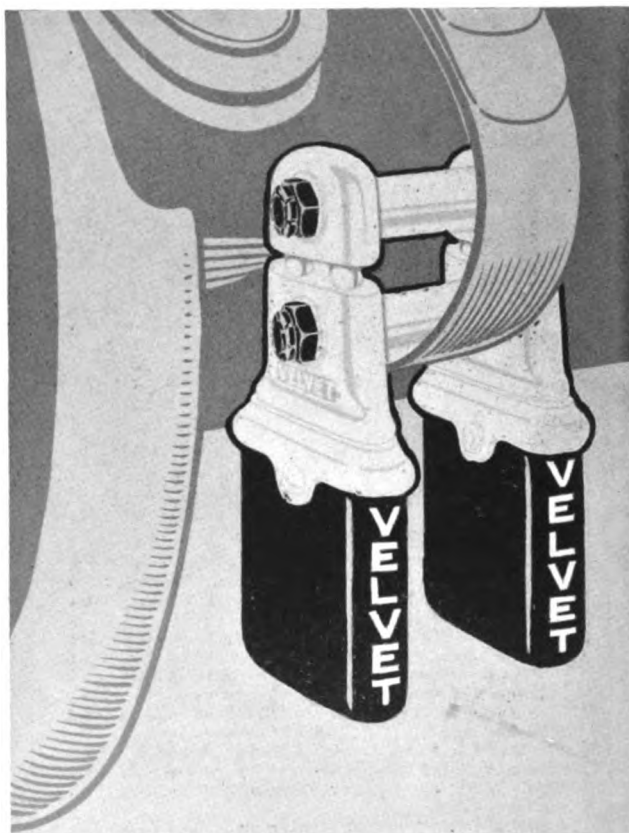
Northwestern Chemical Co., Marietta, O. (Fire-Fly.)

FORD AUTOMOBILE EQUIPMENT.

Danver Accessory Co., 18 Broadway, Pawtucket, R. I. (Daco.)
Russell Mfg. Co., Middletown, Conn.

(Continued on Next Page.)

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WARNING.

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(BUYERS' GUIDE—Continued.)

FUNNELS.

Dover Stamping & Manufacturing Co., Cambridge, Mass. (Dover.)

GASKETS AND GASKET CUTTERS.

Shawver Co., Springfield, O.

GEARS, STEERING.

Ross Gear & Tool Co., 794 Heath St., Lafayette, Ind.

GUNS, GREASE. (See Pumps, Oil and Grease.)

HORNS.

Bonner, D. Henry, Co., Cambridge, Mass. (Tremo.)
Garford Mfg. Co., Elyria, O. (Tuto.)

JACKS, ETC.

Shawver Co., Springfield, O.

LAMPS, TAIL. (See Tail Lights.)

LEATHER GOODS.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

LIGHTING SYSTEMS, ELECTRIC.

Garford Mfg. Co., Elyria, O. (Dynalux.)

LUBRICANTS.

Alsten & Goulding Co., 36 Foster St., Worcester, Mass. (Alding.)

Continental Asbestos Corporation, Worcester, Mass. (Spedolene.)

Dixon Crucible Co., Jos., Jersey City, N. J. (Graphite.)

Eagle Oil & Supply Co., 104 Broad St., Boston. (Eagle-line No-Karbon.)

Haws, Geo. A., 148 Front St., New York. (Panhard.)
Branch: 899 Boylston St., Boston.

Indian Refining Co., 17 Battery Place, New York City. (Havoline.)

New York & New Jersey Lubricant Co., 165 Broadway, New York. (MoToRol, Non-Fluid, Kejex.)

Northwestern Chemical Co., Marietta, O. (Gear-Silence.)

Platt & Washburn Refining Co., 7 Broadway, New York City. (Veedol.)

Standard Oil Co., New York. (Polarine.)
Branches: In all cities.

Vacuum Oil Co., Rochester, N. Y. (Mobiloil.)

Branches: 49 Federal St., Boston; 29 Broadway, New York; Fourth and Chestnut Sts., Philadelphia; 154 Exchange St., Bangor, Me.; 406 Hitchcock Bldg., Springfield, Mass.; 117 Commercial St., Portland, Me.; Fisher Bldg., Chicago; Ford Bldg., Detroit; Indiana Pythian Bldg., Indianapolis.

Valvoline Oil Co., 27 State St., Boston. (Valvoline.)

MAGNETO COVERS.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

MAGNETOS AND SUPPLIES.

Bosch Magneto Co., 223-225 W. 46th St., New York.

Branches: 119-121 E. 24th St., Chicago; 1250 Woodward Ave., Detroit; 357 Van Ness Ave., San Francisco.

Eisemann Magneto Co., 32 33rd St., Brooklyn, N. Y. (Eisemann.)

Branches: 123 W. 52d St., New York City; 514 No. Capitol Ave., Indianapolis; 802 Woodward Ave., Detroit.

Heinze Electric Co., Lowell, Mass. (Heco.)

Holtzer-Cabot Co., Brookline, Mass.

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NEW REGAL CAR HAS MANY REFINEMENTS.

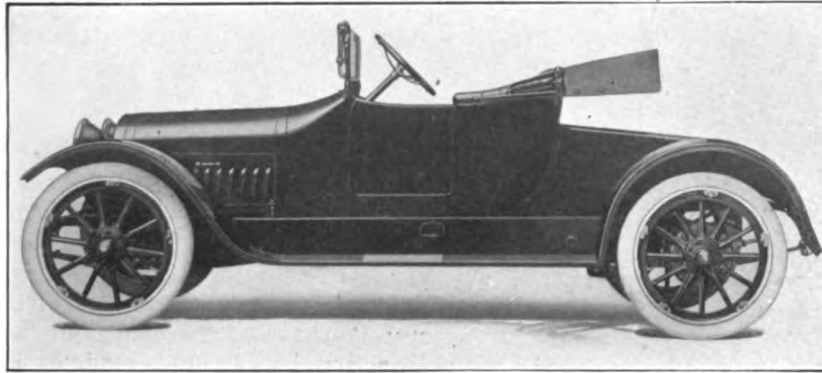
FOR the season of 1915 the Regal Motor Car Company, Detroit, will produce one chassis, the model D, to which will be fitted two types of

shaft is employed, the front and centre bearings being 2.5 inches and the rear 3.5. The bearing material is die cast babbitt. The crankshaft material is a 40-point carbon steel, drop forged, ground and double heat treated. The diameter of the drop forged, case hardened and ground camshaft is .875 inches. It is supported in three phosphor bronze bearings and the cams are integral.

The pistons are accurately ground to size and carry three sets of three concentric steel rings above the wristpin, which is of steel tubing, hardened and ground. Three oil grooves at bottom of the piston insure proper lubrication and

prevent smoking. The connecting rods are drop forged from a 35 per cent. carbon open hearth steel, double heat treated, and the big end bearings are two by 1.625 inches. The wristpin end which oscillates has a bearing of .875 by 1.8125 inches.

The valves are located on the left and enclosed by a single sheet steel cover, easily displaced. The valves have a port diameter of 1.65625 inches, clearance of .002 inch, and the steel stems are electrically welded to the cast iron heads. The valve guides are cast integral with the cylinders and the tappets are of steel, hard-

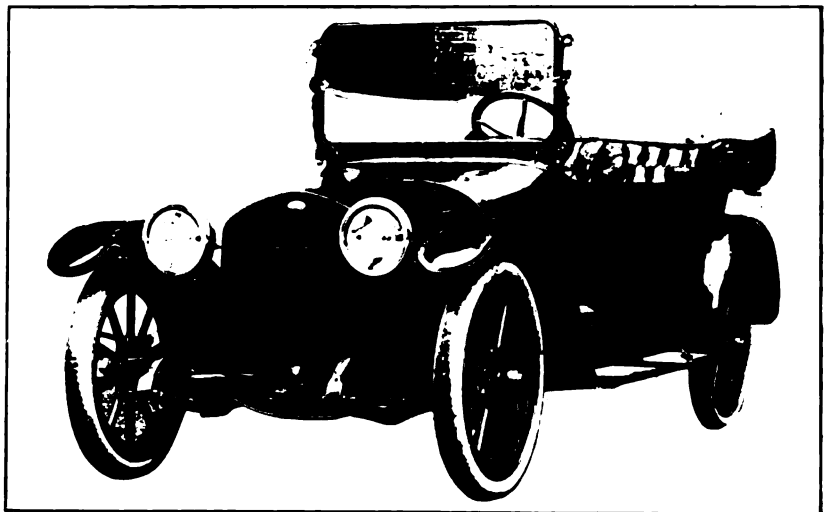


Regal Two-Passenger Roadster, Having Long Stroke Motor, Underslung Springs and Noticeable for Many Refinements.

bodies, a two-passenger roadster and a five-passenger touring design. The new car differs in a number of respects from the 1914 line, which included two chassis, it being fitted with a long stroke motor, 112-inch wheelbase, three-quarter floating rear axle, Stewart carburetor and Atwater Kent automatic ignition system. The equipment is most complete and the price has been considerably reduced. No change has been made in the spring suspension, the Regal underslung feature being continued.

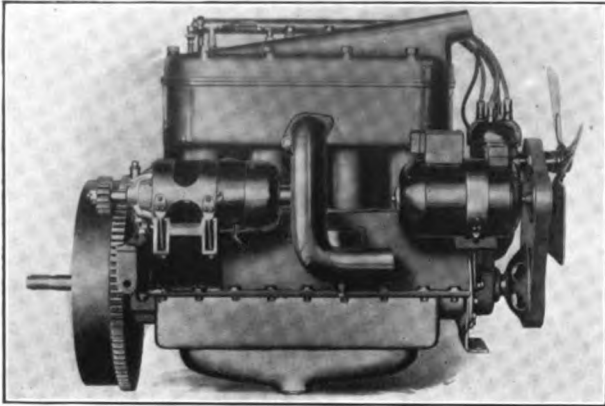
The bore of the motor is the same as was used in the models T N and N C, 3.75 inches, but the stroke has been lengthened to five inches, obtaining a piston displacement of 221 cubic inches. The S. A. E. horsepower rating is 22.5, but the motor has developed 39.4 at 1960 revolutions a minute. The maximum number of revolutions a minute is 2600.

The four L head cylinders are cast en bloc with the crankcase, and compactness and simplicity are noticeable in the design. The lower half of the crankcase is of pressed sheet steel, galvanized after forming, and the power plant is supported by three bearings, one at the front and two at the rear. A three-bearing, 1.625-inch crank-



Model D Regal, a Five-Passenger Car of Attractive Body Lines, and Completely Equipped.

ened and ground. They are adjustable by a set screw and lock nut. The spiral hobbled timing gears are cast of iron and steel, making for silent



The New Regal Motor Is Noticeable for Simplicity of Design and Accessibility of Components.

operation, and are enclosed in an oil tight aluminum cover.

Cooling is by the thermo-syphon system and all factors are large, insuring a proper working temperature under all conditions of service. The cellular type of radiator is so mounted as not to be affected by road stresses, and the filler cap is incorporated with the water manifold. The capacity of the cooling system is four gallons. Cooling is further aided by a three-blade, belt driven fan, located on the front of the motor and adjustable by a swinging arm support and clamp screw.

The lubrication system is a combined splash and pressure feed. A plunger pump, located on the left hand side of the motor, and driven by an eccentric on the camshaft, draws the oil from the sump in the lower crankcase, forcing it to the rear crankshaft and camshaft bearings, also to the outer timing gears. The overflow is collected in troughs into which the connecting rods dip, splashing the lubricant to the centre and front bearings, etc. The capacity of the reservoir is one gallon and all oil is filtered.

Carburetion is by a Stewart of the automatic type and ignition by the Atwater Kent automatic system having automatic spark control. The distributor is located on the timing gear cover, and the current supply is an 80 ampere-hour storage battery and set of dry cells. The distributor is driven by spiral gears off the camshaft, and is readily accessible.

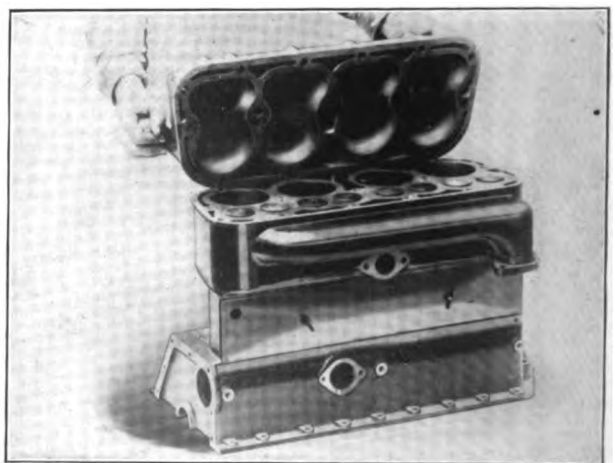
The clutch is a leather faced cone, the easy engagement of which is emphasized. The gear-set is of the selective type, located on the rear axle and provides the conventional number of

forward speeds and reverse. The shafts are a 3.5 per cent. heat treated nickel steel and the one-inch face gears are cut from a similar material. Hyatt high duty bearings are utilized.

Drive is by a 1.1875-inch diameter high-grade steel shaft, and two universal joints are employed, one back of the clutch and the other just forward of the transmission on the rear axle. The torsion tube is supported by a fork at the centre cross frame member, and the radius rods are connected to the frame by brackets. The driving shaft is housed in a steel tube.

The rear axle is of the three-quarter floating type with housing material of malleable iron. The axle shafts are 1.25 inches in diameter, of a high-grade carbon steel, and Hyatt high duty bearings are employed for the differential and wheels. Nickel steel is employed for the pinion gear and carbon steel for the large gear. These gears are accurately cut and meshed and are noiseless in their action. Inspection is made easily by means of a large plate, as will be noted by an accompanying illustration. The frame is of carbon steel, .15625 inch thick, has a four-inch channel section and is 1.5 inches wide. Three cross members are utilized.

The underslung spring suspension, a feature of the Regal car, is continued. The front springs are semi-elliptic, two inches wide and have seven leaves. The rear members are three-quarter elliptic, and have eight two-inch leaves. The material is a special spring steel, carefully ground and polished, and durability, as well as easy riding qualities, are obtained by this method. The



A Removable Cylinder Head Simplifies Displacement of Carbon and Provides Easy Access to Valves in Regal Motor.

spring hangers are a steel drop forging. Self-lubricating bolts are employed and grease cups are provided at the ends of the rear springs.

The front axle is of the I beam section type and its dimensions insure a large factor of safety. The material is a drop forged 30-point open



The Regal Brakes Are Ample in Size.

hearth carbon steel, double heat treated, and the drag link is a steel tube, as is the tiebar, which is located at the rear of the axle.

The driver is placed at the left, with centre control, the H plate quadrant being flush with the floor. The steering column is set at an angle of 45 degrees and is surmounted by a 17-inch wheel, the rim of which is wood. The wheel spider is malleable iron, enamelled black. The steering gear is a Gemmer, of the worm and wheel type, and provision is made for adjustment and lubrication. The use of the automatic spark control eliminates the usual wheel lever.

The clutch and brake pedals follow conventional design, the former being located at the left and the brake member at the right. The accelerator is placed at the right of the brake pedal.

Two sets of brakes are employed, both operating on the rear wheels. The service member is of the external contracting type, and the emergency of the internal expanding design, operated by the usual hand lever. The diameter of the brake drums is 12 inches and the face 1.75, ample for the weight of the car. The brake material is Raybestos.

The wheels are of the artillery type, fitted with quick detachable, quick demountable rims and Goodyear 32 by 3.5-inch straight side tires. The wheelbase is 112 inches, and tread standard. 56. The body material is steel and the dash is integral with it. The fuel tank has a capacity of 10 gallons and is located under the front seat. The standard finish is Regal blue and the best grade of black leather is employed in the upholstery, which is deep and luxurious. The finish is in keeping with the high standard that has been es-

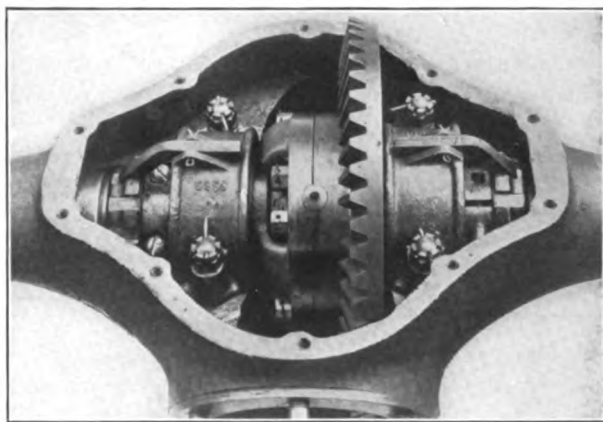
tablished by the Regal Motor Car Company.

The electric light and motor starting system is two separate units. The Rushmore motor starter is geared to the flywheel of the engine and the dynamo is driven by belt, a noiseless form of drive. The battery is an 80 ampere-hour member.

As is becoming general practise, the side lights are eliminated, the headlights serving for both city and country driving. The control units are conveniently mounted, and the body designs are noticeable for their streamline effect. The lines of the fenders and aprons blend harmoniously with those of the body, the latter being noticeable for its low centre of gravity, a feature of the Regal cars in the past.

The equipment leaves nothing to be desired, including a Stewart-Warner speedometer, Rands windshield, top, slip cover, tools, etc. The new Regal chassis is noticeable for the accessibility of its components, and many of the improvements make for economical maintenance. For example: The carbon may be removed from the cylinders and the valves ground easily, as the cylinder head is removable, as will be noted by an accompanying illustration. The Regal motor D will appeal to those motorists who desire a machine having ample power to meet all requirements of service and capable of being maintained at a minimum of cost.

The Miller Rubber Company, Akron, O., has purchased the land joining its plant at High street and Stanton avenue. A 2000-horsepower plant has already been laid out. After increasing



Showing the Sturdy Differential Utilized in the Model D Regal Chassis.

its floor space by 95,000 square feet a short time ago, the company is now about to further enhance its facilities in a material way.

CORRESPONDENCE WITH THE READER.

Pipe Jig—O. B. G., Colorado Springs, Col.

How can the gasoline pipe be bent into a coil without kinking it? How are gears measured to obtain distances, holes, pitch, etc?

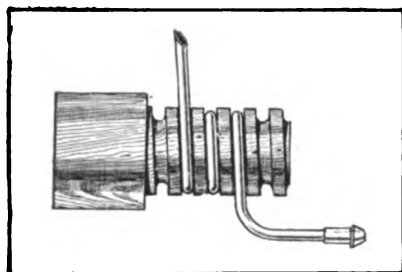


Fig. 1—Jig for Bending Tubing.

To bend the fuel tubing into a coil it is desirable to use annealed piping and to fill it with sand, resin, etc., to prevent its kinking. If a nice job be desired the jig shown at Fig. 1 will be useful. It is constructed from a piece of hard wood about three inches square and about eight long, although these dimensions can be changed to meet requirements.

One end of the plug is turned down to about $2\frac{1}{2}$ inches in diameter and the cut made about five inches from the end, although it could be made less, depending upon the number of coils desired. On the smaller portion is cut a deep thread, about 5-16 inch deep as shown, and a round nosed tool of the same radius as the outside of the pipe to be employed is best adapted for the work.

To use the jig, its square end is clamped in the vise. If the piping is hard, it should be annealed by heating to draw its temper. The section to be bent is then filled with resin. Next place the part of the pipe where the bend is desired in the first part of the thread, holding it down with one hand and with the other wind it carefully round the plug the necessary number of turns, finishing with the ends just opposite each other. The tube is then unscrewed and the resin melted out.

In measuring gears—for example, those of the spur, involute type—the factors to be considered are: Pitch, pitch diameter, outside diameter, face, hub diameter (if hubs are to be used) and hole.

Diameter, when applied to gears, is always understood to mean the pitch diameter. Diametral pitch is the number of teeth of each inch of the pitch diameter. For example: If a gear has 40 teeth and the pitch diameter is four inches, there are 10 teeth to each inch of the pitch diameter and the diametral pitch is 10, or in other words, the gear is 10 diametral pitch.

There is a difference between the pitch and outside diameter, as will be noted by reference to Fig. 2, which indicates the factors requiring consideration in the measurement of gears. It will be seen that the pitch diameter is slightly less than the outside diameter and this should be borne in mind when figuring the distance between the driving and driven gear.

The distance between the centres of two gears may be obtained by the following method: Add the number of teeth together and divide the sum by one-half of the diametral pitch. For example: If two gears have 50 and 30 teeth respectively, and are of five pitch, add 50 and 30, making 80, divide by two and then divide quotient, 40, by the diametral pitch, five, and the result, eight inches, is the centre distance.

Drilling Holes in Glass—Information, New York City.

What is considered a practical method of drilling holes in glass?

Holes of any desired size may be drilled in glass by the following method: Take a small three-cornered file and grind the points from one corner and the bias from the other and set it in a brace such as is employed for boring wood, etc. Lay the glass in which the holes are to be bored on a smooth surface covered with a blanket or some other similar material, and begin to bore the hole. When a slight impression is made on

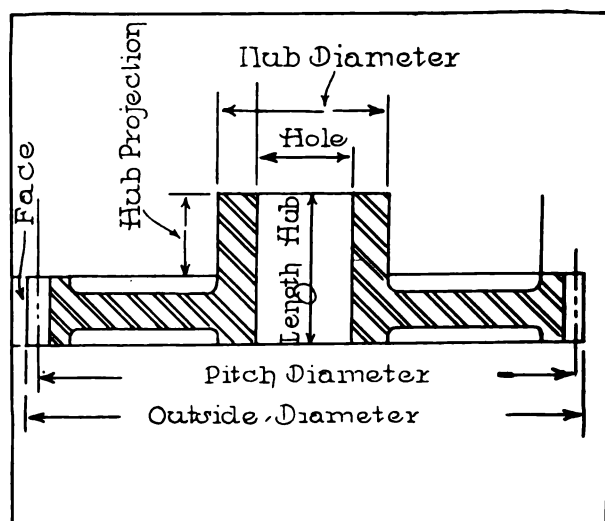


Fig. 2—Measurements to Be Considered in Utilizing Spur Gears of Involute Form.

the glass, place a disc of putty around it and fill with turpentine to prevent heating by friction. Continue boring the hole, but be careful not

to press too hard upon the brace while operating the drill.

Charging Dry Cells—A. B. K., Portland, Me.

Can dry cells that have become exhausted be re-charged and what would be the cost?

Dry cells can be placed in a serviceable condition by different treatments, but the trouble and expense involved would not warrant the expenditure. It is cheaper and more satisfactory to purchase new batteries.

Lights and Master Vibrator—F. A. J., Waterbury, Conn.

Am a new owner and wish to install a master vibrator on a second-hand Ford, also wish to use electric lights. Will you please publish a wiring plan for the vibrator, also dry cells for starting and for running lights?

A wiring plan for a master vibrator, dry cells and lights is shown at Fig. 3. It will be noted that neither the secondary wires leading from the regular coil to the spark plugs, nor the leads from the timer are disturbed.

After fitting the master vibrator to the dash, short circuit or shunt the regular coil. This is done by either screwing down the adjusting screw of each coil unit or utilizing a piece of copper wire as shown in the drawing.

The vibrator is connected up by leading one wire from the battery terminal on the regular coil to the centre post on the vibrator. The right hand terminal of the vibrator is then connected to the magneto terminal. One side of the battery circuit is grounded to some metal part of the chassis, while the other wire is led to the left hand terminal of the vibrator.

By throwing the switch lever to the right, current will be taken from the magneto, while the left position will bring the batteries into service.

In installing the lamps, one side of their circuit is grounded as shown. The other wire is led to the lighting switch, and a connection made between it and the right hand terminal of the master vibrator. The switch permits of cutting in or out the lamps as desired when the motor is operating.

Battery Terminals—Constant Reader, Asbury Park, N. J.

Am driving a car which uses two sets of dry cells for ignition. I have experienced much trouble in the past by the terminals on the zinc or outside of cells breaking off when I attempt to tighten them up. What is the cause and what is the remedy?

The most common method of attaching the terminals referred to is to use solder. The terminals are slotted and fit over the metal shell, and are easily broken off unless one is careful in using the pliers. The remedy is to resolder the terminals and either use a type of connection that does not require pliers or be more careful in tightening the locking knurled nuts.

Fuel Savers—Information, Boston.

Noting a Ford car fitted with a fuel saving device, I am writing for your opinion as to the merits of these. The car in question had a petcock on the dash and a pipe led to the intake pipe just above the carburetor. The owner told me that by opening the petcock and admitting air he gets better power than ever. Why does the device improve the running of the car if it does?

While the writer has not operated a machine fitted with the device referred to, he knows of several owners who have installed similar fittings and all speak very highly of their operation, stating that considerably more power is obtained. This was demonstrated to the writer with the

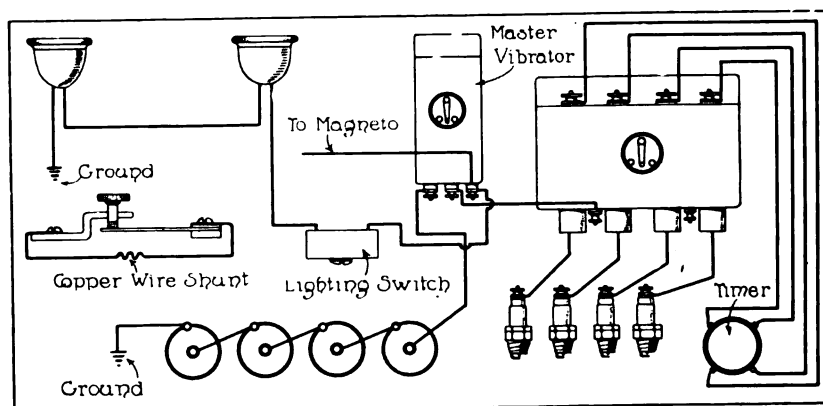


Fig. 3—Wiring Diagram for Master Vibrator, Batteries and Electric Lights
—The Small Sketch Shows Method of Shunting or Short Circuiting the Regular Coil.

motor idling. With the petcock closed and open, the difference could be noted easily, the engine picking up when the extra air was admitted.

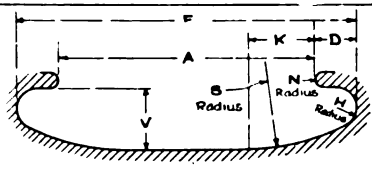
The principle involved is that the air drawn in by the suction of the piston breaks up any particles of fuel that have not been completely vaporized by the carburetor, and striking the mixture as it does, produces what might be termed a whirling motion. This tends to make a more homogeneous mass.

The New York Automobile Association is completing the organization of a bureau to prevent car thefts and recover stolen cars. Members of the affiliated clubs of the organization have been requested to telegraph full descriptions of their cars to the New York headquarters of the association the moment one disappears. A reward for recovery will be offered.

E. R. HALL CRITICIZES S. M. M. T. RIMS.

AMONG the papers read at the semi-annual meeting of the Society of Automobile Engineers, held at Cape May, June 23-26, was that

TABLE I



SIZE	WIDTH A	DEPTH V	EXTREME WIDTH, E A+1.4V	LENGTH OF HEEL, D .7V	RADIUS OF HEEL, H .326V	LENGTH OF SOLE, K 1.09V	RADIUS OF SOLE, S .326V	RADIUS OF SOLE ANCHORAGE, N
65 (on 75)	38.5	10	52.5	7.0	3.26	10.9	35.79	1.75
90	51.5	12	68.3	8.4	3.91	13.08	42.92	2.0
105	62.5	14	82.1	9.8	4.56	15.26	50.05	2.0
120	67.5	16	89.9	11.2	5.22	17.44	57.92	2.25
135	77.0	17	100.8	11.9	5.54	18.53	60.82	2.5
150	90.5	18	115.7	12.6	5.96	19.62	64.42	2.5
175	90.5	18	115.7	12.6	5.96	19.62	64.42	2.5

presented by E. R. Hall, experimental engineer of the Goodyear Tire & Rubber Company, on S. M. M. T. standard rims, which was as follows:

Ever since the clincher type automobile rim has become popular in Great Britain and Europe a very chaotic condition has existed in millimeter rim design. Each manufacturer of millimeter rims had his own so-called standard design to which he worked and the result was that rims marked the same size and supposed to take the same tire differed widely in design. The tolerances which the rim manufacturers allowed themselves were so gross that there was oftentimes considerable variation between two rims of the same size and manufactured by the same manufacturer. This condition prevailed in spite of the fact that it is ruinous to a beaded edge or clincher type tire, such as is in general use abroad, to be used on a rim which it does not fit exactly. A great hardship was thereby worked upon the tire manufacturers who had to make the bead of their tire small enough to slide into the smallest rim of its rated size on the market, and to

TABLE II.

Rated Rim Size	Tire Seat Circumference		Tire Seat Diameter	
	Millimeters	Inches	Millimeters	Inches
650x65	1600	62.992	509.3	20.051
700x65	1740	68.504	553.86	21.805
750x65	1870	73.622	595.24	23.435
710x90	1620	63.780	515.66	20.301
760x90	1760	69.291	560.22	22.056
810x90	1930	75.984	614.34	24.186
870x90	2125	83.661	676.41	26.630
910x90	2250	88.583	716.20	28.197
1010x90	2575	101.378	819.65	32.269
765x105	1755	69.094	558.63	21.993
815x105	1924	75.748	612.43	24.111
875x105	2119	83.425	674.50	26.555
915x105	2244	88.346	714.29	28.122
820x120	1790	70.079	566.59	22.307
850x120	1840	74.016	594.42	23.560
880x120	1940	77.953	630.25	24.813
920x120	2100	82.677	668.45	26.317
895x135	1855	73.031	590.46	23.247
935x135	2011	79.173	640.12	25.202
900x150	1904	74.960	606.06	23.861
1000x150	2215	87.205	705.06	27.758
915x175	1581	62.244	503.25	19.813
965x175	1800	70.866	572.96	22.557

trust to luck for satisfaction in their product when used on the larger rims of its rated size.

The Society of Motor Manufacturers and Traders of Great Britain in June, 1913, standardized the millimeter clincher rim and later, in September, 1913, adopted a set of permissible tolerances to which the rim manufacturer should work. The society has produced a most complete set of rim checking templates, tapes and printed specifications covering their standard.

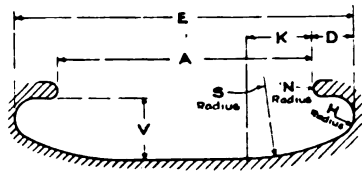
As far as we are able to determine, this standard, known as the S. M. M. T. standard, has been universally adopted abroad.

Although a very great step in the right direction and possibly the best that could be made at this time, the S. M. M. T. standard is open to criticism from the American viewpoint.

The S. M. M. T. standard is given below:

It will be noted that the two chief dimensions of the rim section are the width between clinches marked A and the depth of clinch marked V, and that the majority of the other section dimensions can be expressed in terms of these two. As a matter of convenience and record this feature is admirable. The width of the rim, dimension A, was apparently chosen arbitrarily, as it does not increase in increments corresponding to the increase in rated rim size. Between any two of the first six sections the increase in rated size of rim and tire section is exactly 15 millimeters, while the corresponding increase in width, dimension A, is respectively as follows: 13.0, 11.0, 5.0,

TABLE III



SIZE	WIDTH A	DEPTH V	EXTREME WIDTH, E A+1.4V	LENGTH OF HEEL, D .7V	RADIUS OF HEEL, H .326V	LENGTH OF SOLE, K 1.09V	RADIUS OF SOLE, S .326V	RADIUS OF SOLE ANCHORAGE, N
65 & 75	38	10	52.0	7.0	3.26	10.9	35.79	1.75
90	46	13	66.2	9.1	4.24	14.17	46.56	2.0
105	56	13	76.2	9.1	4.24	14.17	46.56	2.0
120	66	16	90.4	11.2	5.22	17.44	57.92	2.5
135	76	16	100.4	11.2	5.22	17.44	57.92	2.5
150 & 175	86	18	113.2	12.6	5.97	19.62	64.46	2.5

9.5 and 13.5 millimeters. The increase in rated size between the 150 and 175-millimeter rim is 25 millimeters, while there is no increase in width, dimension A. We would have preferred to have this increase in A a constant quantity, possibly 10 millimeters, between any two consecutive sizes from 75 millimeters to 150 millimeters, inclusive, and the increase between the 150 millimeters and 175 millimeters sizes be 0 as at present. This would certainly give a more uniform and logical step-up in tire sectional sizes, provided the tires were made any where near rated size.

Dimension V or depth of clinch increases by very small increments as the rim size increases, not more than two millimeters in any case. As these differences are so small, and in view of the fact that the tolerances prescribed permit them to entirely disappear and in some cases overlap (as will be noted below), we would prefer to see dimension V equal 13 millimeters for both 90 and 105-millimeter rims and 16 millimeters for 120 and 135-millimeter rims. This would give only four different inside rim contours instead of six as at present prescribed, making it necessary for the rim manufacturer to have only four sets of contour rolls instead of six, thus cutting down the forming roll equipment 33 per cent. (Difference in width between any two rims of the same contour can be taken care of where necessary by using blank spacer rolls in rolling). Under these conditions the rims should fit the tires exactly as satisfactorily as in the case of the present standard. With the changes as above outlined the table of standard dimensions of the

rim sections would appear as shown in table III.

Referring to the diameter and circumference table, table II, as standardized, there appears to be but very little difference (approximately 6 millimeters) between the 90 and 105-millimeter circumferences, comparing the 810x90 and the 815x105, the 870x90 and the 875x105, etc. It appears practicable to make these corresponding 90 and 105-millimeter rims of the same circumference, thus permitting over-size tire equipment with the regular standard size tires, enabling the use of an 815x105 standard tire on an 810x90 rim, etc.—a feature of untold value to car users. The differences in circumference are too great between the various other sectional sizes to allow of any further combination of this sort. We feel, however, that in the interest of reduction of the number of sizes the circumferences of the 900x150 and the 915x175 should be the same and the 1000x150 and 965x175 should be the same, even though the nominal sizes are very diversified, thus giving only two rims to take care of these four tire sizes.

It will be noted that these circumferences do not follow any law or direct relation to the tire section, as is the case with the American standard. As an example of American practise, take a 34x4 tire. The tire seat circumference of the rim is 81.682 inches, giving a diameter of 26 inches. This is equal to the nominal tire diameter (34 inches) minus twice the nominal tire section diameter (four inches).

$$\frac{81.682}{2} = 26 = 34 - (2 \times 4)$$

The S. M. M. T. standard could be very much improved if it were possible to lay it out to some such law.

SIZE M/M	MINIMUM THICKNESS L" IN/M
65 (or 75)	3.0
90	3.0
105	3.0
120	3.5
135	4.0
150	5.0
175	5.0

The above criticisms and suggestions are entirely from the American viewpoint. We must admit that the S. M. M. T. standard as it stands is a very great improvement over former conditions, and is probably the very best that could be attained under the circumstances. Credit is due the Society of Motor Manufacturers and Traders for causing the adoption of an admirable rim section contour comprising excellent proportions, bearing the same relation to each other in all sizes. In this particular their standard is certainly better than the American standard.

It is improbable that any of the improvements to the S. M. M. T. standard suggested above could be incorporated at this time. For this reason we favor its universal adoption in its present form, excepting tolerances (which see below).

The tolerances specified by the S. M. M. T. standard are so great that they almost entirely defeat its purpose from the American standpoint. Accustomed to rims manufactured with a very high degree of precision and to very close tolerances, the American tire manufacturer designs his tire to give an ideal fit on a rim exact to standard and he is sure the tire will fit practically as perfectly in a maximum or minimum rim of its size. If a tire is made to fit a correct S. M. M. T. standard rim as perfectly, the tire cannot be made to enter a minimum rim and will float around and be a very poor fit in a maximum rim.

The S. M. M. T. standard tolerances follow:

Combining table I and IV above we can compile table V, giving maximum and minimum section dimensions:

SIZE	A		V		D	
	MAXIMUM	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM	MINIMUM
65 (or 75)	39.5	37.5	11	9	7.5	6.5
90	52.5	50.5	13	11	8.9	7.9
105	63.5	61.5	15	13	10.3	9.3
120	68.5	66.5	17	15	11.7	10.7
135	78.0	76.0	18	16	12.4	11.4
150	91.5	89.5	19	17	13.1	12.1
175	91.5	89.5	19	17	13.1	12.1

This table shows an overlapping of sizes in a number of cases. For example, for a 120-millimeter rim V maximum equals 17 millimeters and D maximum equals 11.7 millimeters, while for a 135-millimeter rim V minimum equals 15 millimeters and D minimum equals 11.4 millimeters. Yet in a properly designed 120-millimeter tire bead V is one millimeter less and D is 0.7 millimeter less than in the case of a 135-millimeter tire bead. In table IV above the circumferential tolerance is three millimeters or a total tolerance of six millimeters. This large tolerance would cause a hardship in the use of in-extensible bead tires similar to the majority of tires used in America in connection with quick detachable type rims to the S. M. M. T. standards. On a maximum rim the tire would be extremely hard to apply and on a minimum rim it would fit very loosely, having a tendency to creep, making it always necessary to use flaps to keep the inner tube from being pinched between the tire bead and the rim.

Below is a table showing a comparison between S. M. M. T. and American standard rim tolerances given in both inches and millimeters.

As will readily be seen there is a marked difference, the American tolerances being very much closer and correspondingly more satisfactory.

American rim manufacturers find it no hardship to work to these American tolerances and there are no rims applied to cars in America today which are not rigidly inspected and passed within these tolerances. The closer tolerances permit of more accuracy in tire design and result in better fit of the tire in the rim, which in turn results invariably in improved tire service—the ultimate goal in all rim standardization.

We see no reason why the American tolerances without change cannot immediately be adopted in connection with the S. M. M. T. standard and so make of it, to all concerned, a more real and much more valuable standard.

DIMENSION	S. M. M. T. STANDARD		AMERICAN STANDARD	
	MILLIMETERS	INCHES	MILLIMETERS	INCHES
A	±1.000	±0.039	±0.381	±0.015
B	±3.000	±0.118	±1.168	±0.046
D	±0.500	±0.020	±0.203	±0.008
V	±1.000	±0.039	+0.203 -0.000	+0.008 -0.000

PREDICTS EXTREMES IN CYCLECAR DESIGN.

AT THE recent meeting of the Detroit section of the Society of Automobile Engineers, W. B. Stout, chief engineer of the Scripps-Booth Company, read a paper on "The Future of the Cyclecar".

The author has been connected with the cyclecar industry since its inception, and it is evident that his investigations have caused him to modify the ideas he held during the early days of the cyclecar. Mr. Stout holds that economy is best obtained with the four-cylinder motor when a standard clutch and gearset are employed. His paper in part was as follows:

The cyclecar movement started with the desire for producing the cheapest possible motor vehicle. This desire still obtains throughout the industry, but it has been learned by cyclecar makers in their experience to date that what were first considered the cheapest constructions were not developed to a point which made them advisable as was thought for the construction which was first attempted.

The first makers of European cyclecars placed the weight at from 450 to 500 pounds and spoke of the extreme simplicity of the V motor, belt drive, together with tandem seating. This publicity started America along the line of similar development, for it was well known that the motors and transmissions named were fully capable of handling the 450 to 550-pound vehicle on the narrow tread.

Cars Exceeded Weight.

On building up the cars, however, the advertised weight of 450 pounds came nearer to 750 in actual fact, while some of the cars ran as high as 900 pounds, even on 36-inch tread. In spite of this fact the motors handled the work well, made high speed and covered long distances. The chief objection to the motor from the standpoint of the public was noise, and from the standpoint of the manufacturer, sales, while the manufacturer of cars objected very strongly to the prices which were demanded for these V motors. In theory the V motor is much simpler than the automobile motor, having fewer parts and somewhat less weight. On this theory it would be possible for makers of V motors to build these for less money than a four-cylinder—the fact of the matter is that one can buy a good four-cylinder of greater horsepower and more reliability, or less noise and of more flexibility, for less money, even including radiator and connections, than he can buy the usual first-class V twin.

Drives Compared.

The first makers using friction and belt drive have found that they can buy a complete gearset and clutch of standard construction for less money than the belt drives, while the sales cost with this standard construction is much less than with this newer drive, to which the public must be educated.

From the standpoint of the cyclecar enthusiast who has talked V motors and belt drives, one feels that something has been lost in that the makers have in so large a number left the seeming simplicity for more complication, but a close analysis shows that there is really less complication and trouble from a standard arrangement than has been enjoyed in the V motor and belt driven arrangement.

It would seem from all this that the cyclecar idea is being lost sight of, as so many predicted at the beginning of the movement, and that the smaller car movement only was being solved. This, however, is far from being the case.

Field for Light Car.

There is still the field of the ultra-light cyclecar, a field which as yet no manufacturer has seriously entered. This field is the one which is to produce the simplest possible car, and it may be with a V motor of new and

simpler design than has been offered, and with some simpler form of transmission than has been built to date, or it is possible that the car may be light enough and the motor powerful enough, so that the clutch and chain to the rear axle may suffice for all ordinary running of this car, which will sell for not over \$300. It is probable that this vehicle will be built to seat one person, like a motorcycle, but with an extra folding seat, which can be used for overland trips.

To Use Larger Motors.

The other class of car is going to a larger sized motor, so that most of the light cars will have motors around 95 cubic inches; treads 36-inch to standard, while all sorts of seating arrangements are to be used.

As to the cars which tried out tandem seating and narrow treads, nearly all of them are retaining this idea. A road quality has been discovered in this type of car which, so far as the writer knows, never has been equalled in any other type of road vehicle. There is a handiness about the car in city traffic which cannot well be imagined when one realizes that these cars slip through narrow places like a motorcycle, that they accelerate faster than big cars and stop as quickly.

The Cyclecar on the Road.

The cyclecar on the road does not run between the ruts, as has been claimed; as a regular thing it runs for the most of the time with one wheel in the rut and the other wheel on some good, smooth surface, which may be outside the left hand rut, or in the middle of the road, or even off to one side on a path smoother than the ruts themselves.

One of the angles of cyclecar development which must not be forgotten in designing the car is that of sales. The American public is generally a mechanically educated public; it knows construction, it knows what big car construction will do, and ignores the limitations of these constructions which have become common and which they are used to. A cyclecar owner will stand twice the trouble from a four-cylinder motor of standard construction than he will from an experimental or unusual type of engine, and this must be taken into account in cyclecar work.

Advantages of Cyclecar.

The man who can best understand the advantages of the cyclecar is that man who is now driving a high priced heavy car. He knows its limitations; he knows that money alone does not produce comfort and maximum speed. He wants to get to his business and back in the shortest possible time with the least possible effort and dirt. He knows that his big car holds him up in city work, and narrow tread cyclecars are showing him also that he is being held up in country work. As a result he is ready to buy a cyclecar when he can be shown one that has all the dignity of a big car, has all its lines and finish, has real equipment and is luxurious in its appointments.

Future of Cyclecar.

The future will see cyclecars of aristocratic construction, as well as the spidery four-wheeled motorcycle at \$300. It is very probable that within the next two, or three years cyclecars will be produced, costing as high as \$1000, which will sell in quantities on performance alone. As yet it is impossible to define the cyclecar, but the writer is of the opinion that the cyclecar will be sold as a vehicle of maximum road performance under all conditions for two or three-passenger service.

The Studebaker Six, in the second of its five 200-mile tours, averaged 15.3 miles to a gallon of gasoline. In connection with this, two quarts of oil and three quarts of water were used. The car carried six passengers and the run was through the foothills of the Alleghenies, over the rough roads and hills on the southern boundary line of the state, the exact mileage being 206.7.

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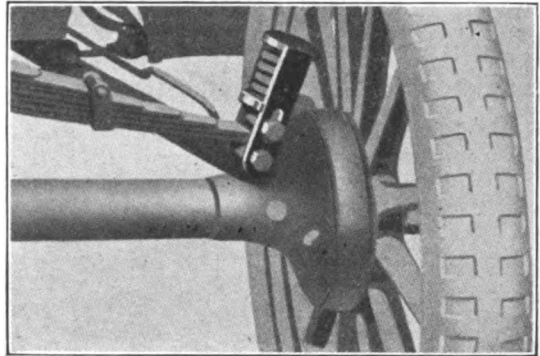
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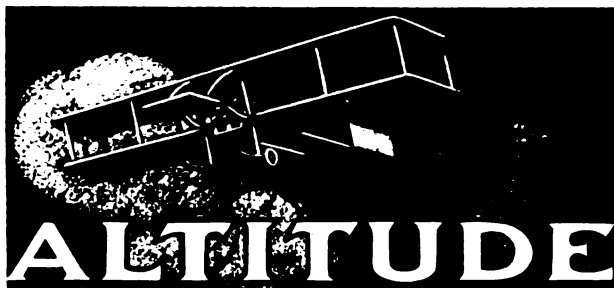
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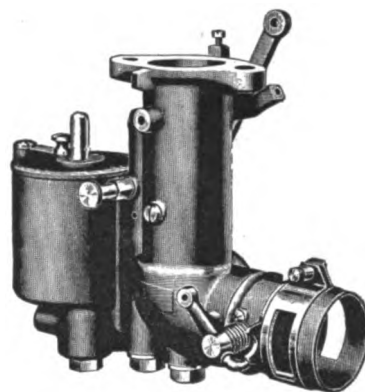
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(When Writing to Advertisers, Please Mention The Automobile Journal.)

(BUYERS' GUIDE—Continued.)

City. (Lax-Fal Guaranteed.)

Metz Tire & Rubber Co., Akron, O.

United States Tire Co., Broadway and 58th St., New York.
(Continental, G & J, Hartford, Morgan & Wright.)

Branches: See Rims—Removable and Detachable.

TIRES—SOLID AND COMMERCIAL.

Goodrich Co., B. F., Akron, O. (Goodrich.)

United States Tire Co., Broadway and 58th St., New York.

Branches: See Rims—Removable and Detachable.

TOPS AND ATTACHMENTS.

Springfield Metal Body Co., 20 Medford Ave., Springfield, Mass.

TRUCKS AND TRACTORS—(See Cars, Commercial.)

TRUNK RACKS.

Connecticut Steel & Wire Co., Hartford, Conn.

VALVE LIFTERS.

Paro, H. G., Suite 718-719, Michigan Blvd. Bldg., 30 No. Michigan Blvd., Chicago.

Winsor Manufacturing Co., Providence, R. I.

VARNISHES, ETC.

Rub-On Mfg. Co., 87-97 Brayton St., Buffalo, N. Y.

Valentine & Co., 456 Fourth Ave., New York City; 343 So. Dearborn St., Chicago; 74 Pearl St., Boston.

VENTILATORS.

Wattles, C. B., 441 Butler Exchange, Providence, R. I.
(Excelsior Adjustable.)

VIBRATORS. (See Master Vibrators.)

VOLTMETERS—(See Ammeters.)

VULCANIZERS.

National Motor Car Supply Co., 5604 Euclid Ave., Cleveland. (National Garage Steam and Wizard Automatic.)

Vanderpool Co., Springfield, O.

Williams Foundry & Machine Co., Akron, O.

WELDING OUTFITS.

Prest-O-Lite Company, 226 Speedway, Indianapolis.
(Prest-O-Welder.)

Branches: See Cylinder Cleaning Compound.

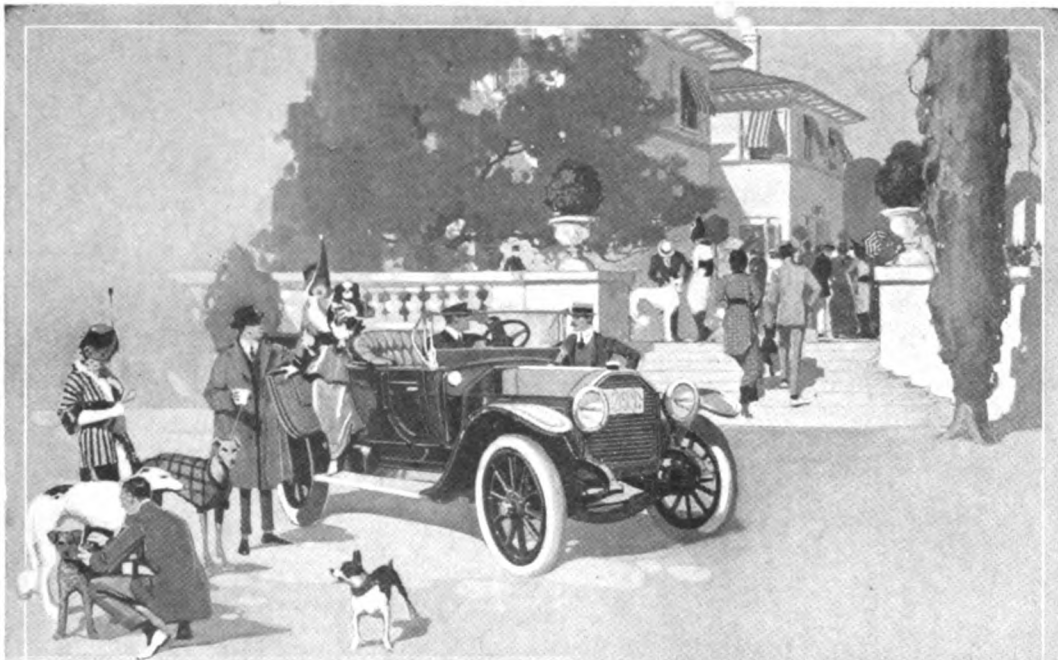
WHEELS, WIRE.

Houk Co., Geo. W., 1709 Elmwood Ave., Buffalo, N. Y.
(Houk Detachable.)

WRENCHES AND COMBINATION OUTFITS.

Coes Wrench Co., Worcester, Mass.

Mossberg Co., Frank, Attleboro, Mass.





BEAUTY

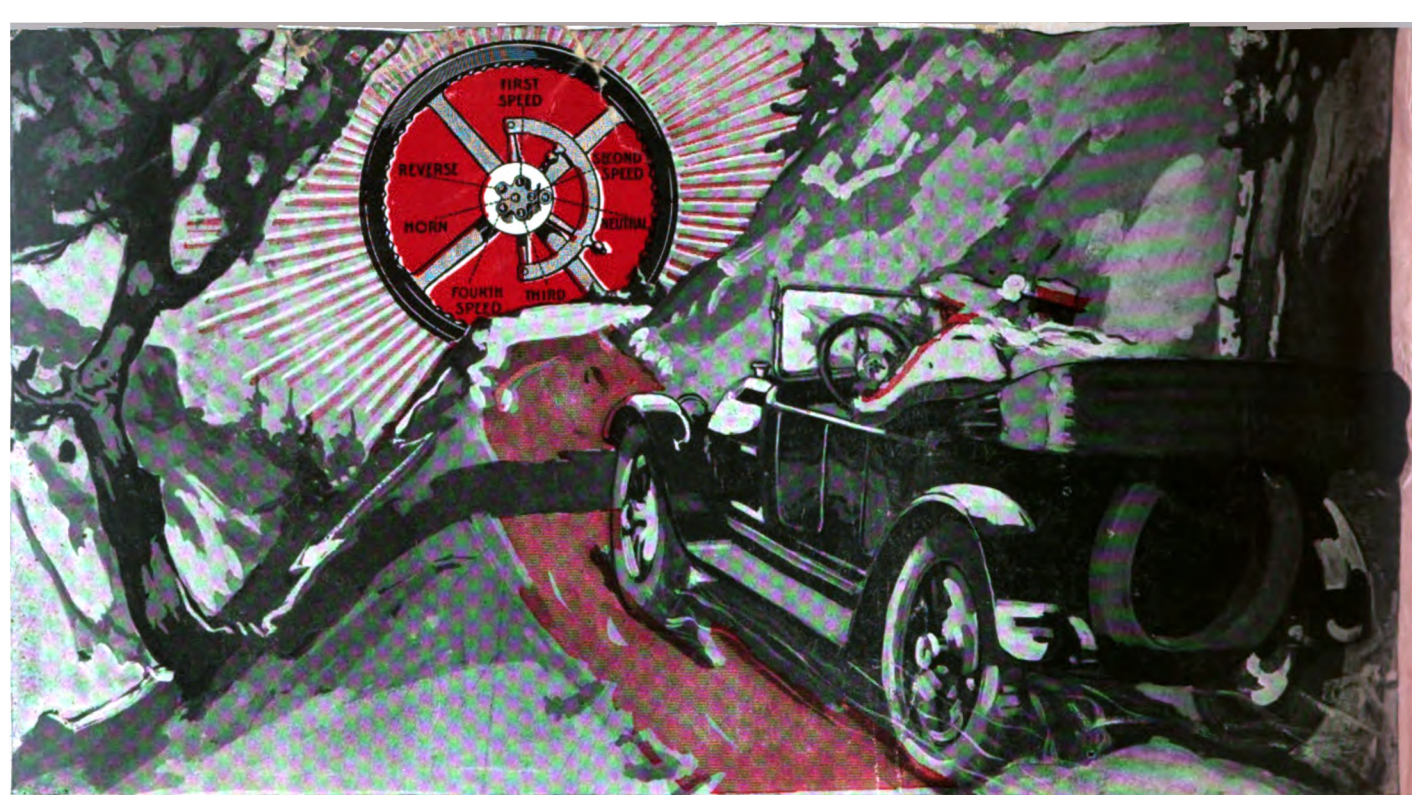
"Whatever is in anyway beautiful hath its source of beauty in itself."—Marcus Aurelius.

The beauty of the **PEERLESS** car arises from the perfect adaptation of means to an end. It is a beauty of utility and efficiency. The car was fashioned first of all for strength and power, for safety and comfort; and because it is well proportioned and gracefully shaped to its purpose, it is beautiful.

Safety, comfort and beauty are **PEERLESS** ideals.

THE PEERLESS MOTOR CAR CO.
CLEVELAND
 (Licensed under The Kardo Company Patents)
 Makers of Peerless Trucks

PEERLESS DISTRIBUTORS IN IMPORTANT CENTERS
ALBANY, The Albany Garage Co.; **BALTIMORE**, Zell Motor Car Co.; **BOSTON**, Peerless Motor Car Co.; **CHICAGO**, McDuffee Automobile Co.; **DENVER**, Maxwell-Chamberlain Motor Co.; **KANSAS CITY**, Holker-Elberk Mfr. Co.; **MEMPHIS**, The Lilly Carriage Co.; **MINNEAPOLIS**, T. M. Anderson; **NEW ORLEANS**, Fairchild Auto Co.; **NEW YORK**, C. T. Silver Motor Co.; **PHILADELPHIA**, Peerless Motor Car Co.; **PITTSBURGH**, The Hiland Auto Co.; **PORTLAND**, H. L. Keats Auto Co.; **SAN ANTONIO**, Woodward Carriage Co.; **SAN FRANCISCO**, H. O. Harrison Co.



THE DAWN OF A NEW DAY

There is another epoch-making application of an old principle—the use of a pushbutton and electro-magnet to simplify and render safe the control system of the gasoline motor car.

So Simple

is the improved method of shifting gears by electricity that it places the most powerful gasoline car completely under the control of even a woman, and makes the operation of shifting gears as simple as the ringing of a doorbell or the clicking of a kodak.

Particularly When Touring

Motorists will appreciate the ease and rapidity with which gears can be changed. The Vulcan Electric Gear Shift relieves the driver of that feeling of nervousness with which all those who have driven in mountainous country are familiar—

a kind of dread of not being able to change gears *quickly* at critical times.

The Operation of

the Vulcan Electric Gear Shift is very simple and positive—*just press the proper button in the center of the steering wheel, push the clutch pedal all the way down, and Presto!—the whole thing is done—easily, quietly, instantly.*

It is with a distinct feeling of relief that the experienced driver, in operating the Vulcan Electric Gear Shift, realizes that, at last, the troublesome problem of gear shifting has been solved correctly.

That it is possible for him to sink back into the cushions and enjoy the scenery along the way with perfect confidence in his ability not only to meet conditions as they arise, but also to anticipate them and make his selection of the proper gear

to be used before the critical time arrives.

The Vulcan Electric Gear Shift Completes the Electrification of the Gasoline Automobile

The electric starter eliminated the starting crank, the bungle-some control lever now follows. *The Vulcan Electric Gear Shift will be the greatest acknowledged refinement on 1915 cars.*

A number of manufacturers have already incorporated it into their designs. Others are hastening to adapt it to their present models, both here and abroad. *No single improvement has ever created the widespread interest that this electric gear shift has. The increasing stream of letters pouring into our office attests this fact.*

Now is the time to investigate the Vulcan Electric Gear Shift.

Write for full particulars.

The Vulcan Electric Gear Shift Dept.
The Cutler-Hammer Mfg. Co.

Milwaukee

Wisconsin

The VULCAN ELECTRIC Gear Shift

Treat your Engine like a Friend

Paying attention to the requirements of the engine in your car pays big dividends in comfort. Your engine needs only one thing to give you the best that is in it—a lubricating oil that exactly suits its lubricating system.

There are nine systems of lubrication in use in automobile engines. No one oil is made which will suit them all. Although your engine may seem to work all right at first, with an oil not suited to it, engine troubles are bound to follow and it will wear out before its time.

Veedol is not only highly refined and filtered from the best grade Pennsylvania petroleum, but its different grades have also been thoroughly tried out in each of the lubricating systems and the right one for each **proven best by actual test.**

The Veedol Lubrication Chart, the result of these tests, shows exactly which grade of Veedol is suited to your car. Drop in at your dealer's and see the chart, or write us for a copy of it. Then try Veedol—your engine will appreciate it.

Platt & Washburn Refining Company

Established 1878

Incorporated 1885

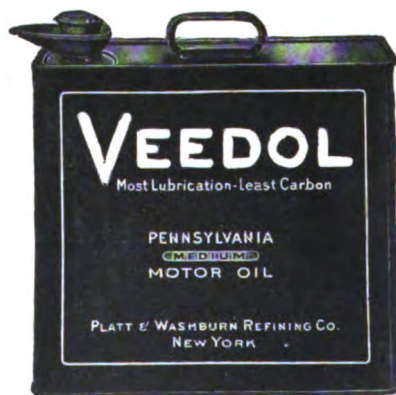
7 BROADWAY

88 Broad St., Boston NEW YORK Delaware and Green Aves., Philadelphia

TO DEALERS: We want responsible representatives for Veedol everywhere. If there is no agent near you, write at once for terms and full information about the intensive, co-operative selling plan by which we are introducing Veedol to car owners in your neighborhood.

The Nine Systems of Lubrication

1. Full Splash
2. Splash with Circulating Pump
3. Pump Over and Splash
4. Force Feed and Splash
5. Pump Over
6. Separate Force Feed
7. Force Feed
8. Full Force Feed
9. Knight Slide Valve Motor





What Good Are Anti-Skid Devices If The Brakes Don't Hold?

And how can brakes be depended upon unless lined with Raybestos, which is the only brake lining so dependable that the manufacturers guarantee it?

Use Raybestos and protect your customers against all accidents due to slipping brakes.

Raybestos is the original brake lining, and our secret process of manufacture is fully protected by patent; substitutes can **not** be made with the same strength, and they may prove **fatal** if used. Insist on Raybestos from your jobber. Recognize it by the name, on every foot, and the silver edges.

THE ROYAL EQUIPMENT CO., 1378 Bostwick Ave., Bridgeport, Conn.

TRADE MARK
Raybestos
REG. U.S. PAT. OFF.

Hartford

AUTO COMFORT

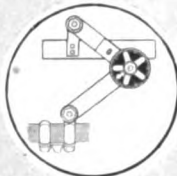
EQUIPMENT

THE HOME OF HARTFORD AUTO COMFORT EQUIPMENT

Automobile accessories of admitted excellence which contribute to the maximum enjoyment of motoring—each a quality product and a proven factor in promoting comfort, economy and safety.

Hartford Bumper

The strongest motor car bumper in the world—no other statement does justice to the Hartford Bumper. A veritable breastwork between car and passengers and the dangers of collision. The four-leaf friction-springs—an exclusive feature—completely absorb the shock and jar. Saves repair bills by preventing smashed headlights, damaged radiators, twisted mud guards, broken springs, etc. Beautifies the smartest car. Made of staunch metal tubing reinforced with a solidified cement-like composition, combining maximum strength with minimum weight. Attached to any car in 15 minutes. Four sizes—\$15, \$12.50 and \$10. Special Ford Type, \$10.



Truffault-Hartford SHOCK ABSORBER

The Truffault-Hartford Shock Absorber is the inevitable choice of motorists who give the three-fold problem of greater comfort, safety and economy, the study it deserves. For ten years this standard device has "made good" by making "Every Road a Boulevard." Today a quarter-million motorists enjoy constant comfort through its use. Twenty-five leading makers recognize Truffault-Hartford as "The Pioneer and the Best" by adopting it. Inventive ingenuity earned for the Truffault-Hartford the exclusive right to use the principle of Rotary Friction. Science and results prove that this is the only principle that actually absorbs shocks and vibration. Absolute comfort, lowered upkeep cost and greater safety are logical results. Prices—Five Models—\$60, \$50, \$35, \$16. Special Ford Type, \$16.



Hartford Auto-Jack

A bright spot in many a wayside stop for repairs is the easy, rapid, efficient work of the Hartford Auto Jack. This handsome tool lifts a heavy car with wonderful ease and quickness. No muscle needed, no back-breaking, perspiring labor—just a simple wrist-movement and up goes the car; a turn of the reversing lever and down it comes smoothly, without jerk. It's all in the gears, ingeniously devised to multiply energy. Made for the motorist willing to pay a little more for something very much better.

Price, \$6.50.



Hartford CUSHION SPRING

Hartford Cushion Springs insure the degree of flexibility which most automobile springs lack. These comfort-conserving devices increase flexibility and provide for easy riding on average roads just as effectively as Truffault-Hartford Shock Absorbers control excessive flexibility and provide easy riding on rough roads. In combination, these devices offer super-comfort on all roads under all conditions. Hartford Cushion Springs eliminate the continual annoyance and discomfort of travel over small ruts and bumps, car tracks, cross-walks, cobblestones, etc. They are compact and unobtrusive, of the finest material and workmanship, and easily applied to any car. Four Models, \$35, \$30, \$25. Special Ford Type \$16.

Guarantee: "Money back if not satisfactory." Under this broad policy all Hartford products are sold. Any article of our manufacture not proving satisfactory after 30 days' trial from date of purchase, can be returned and the purchase price will be refunded.

HARTFORD SUSPENSION CO. E. V. HARTFORD, Pres.
Main Office and Works: 147 Bay St., Jersey City, N. J.
Manufacturers of Hartford Electric Starting and Lighting System
Branches and distributors in all principal cities of United States and Canada Dealers everywhere

When Writing to Advertisers, Please Mention The Automobile Journal.



Wrenches Are Made Right, Stay Right,
Last a Lifetime, and are 30% Stronger
Than Any Other.

"COES" on any Wrench Means Quality,
Best Material and Finest Workmanship.
An Inspected and Tested Wrench. The
Ironclad "COES" Guarantee for Strength
and Finish.

The "COES" Automobile Model are for Motorists
and Repairmen. For Service Specify "COES" No
Tool Kit or Repairshop is Complete Without One.

Ease of Handling Without Fear of Slipping or Bruis-
ing. Perfect Balance and Certain Grip has made the
"COES" the Most Widely Used Tool of the Kind in
the World.

COES WRENCH CO.

WORCESTER MASS.

J.C. McCARTY & CO.
JOHN H. GRAHAM & CO.

29 Murray St. New York City
113 Chambers St. New York City

When Writing to Advertisers, Please Mention The Automobile Journal.

YOU know the old story about the barking dog.

Well—a great many automobile valuations are marketed on the same basis. A lot of loud talking is done—but when the air clears and you happen to ask several pointed and practical questions (as for instance the length of the wheel base, horsepower, kind of upholstery, etc.,) the talk becomes very indistinct and faint.

The more you ask questions about the Overland and the more you compare the answers with corresponding points of other cars, the more you are impressed with the integrity and unusual value of the



\$950 Completely
equipped

\$1075 With electric starter
and generator

Prices f. o. b. Toledo, Ohio

BRIEF SPECIFICATIONS:

Electric head, side,
tail and dash lights
Storage battery

35-horsepower motor
33 x 4 Q. D. tires
114-inch wheelbase

Mohair top, curtains
and boot
High-grade Speedometer

Clear-vision, rain-
vision, windshield
Electric horn

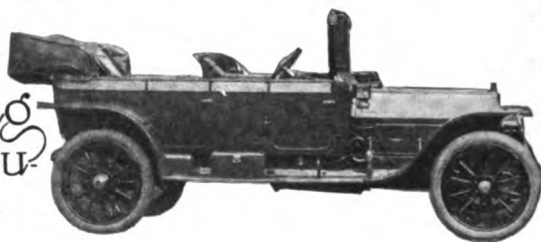
Handsome catalogue on request. Please address Dept. 52.

The Willys-Overland Company, Toledo, Ohio

Manufacturers of the famous Overland Delivery Wagons, Gatzford and Willys-Utility Trucks. Full information on request.

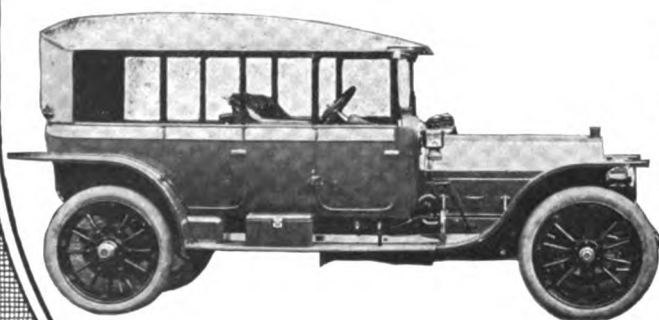
When Writing to Advertisers, Please Mention The Automobile Journal.

The comfort of every car body combined. An instantaneously convertible equipment that affords a touring body or a limousine whenever desired.



Changes can be made on the road as readily as in the garage. No matter what the occasion or requirement, your car with the

SPRINGFIELD CONVERTIBLE BODY is always ready and always has



the accommodation and protection you desire.

Can be raised or lowered

as easily as folding top.

SPRINGFIELD METAL BODY CO.

SPRINGFIELD

MASS.

When Writing to Advertisers, Please Mention The Automobile Journal.

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IMITATED

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THE OIL THAT SUITS
AND DOES NOT SOOT.

Carbon in your cylinders means loss of power. Customers report 10,000 to 15,000 miles with no carbon troubles. A good motto: TRY ANYTHING ONCE. EAGLEINE NO-CARBON AUTO OIL is furnished in 1-5-10 gallon, 30 and 50 gallon Steel Drums with faucets for which no extra charge is made.

EAGLE OIL
AND SUPPLY CO.

104 BROAD STREET, BOSTON, MASS.

"THE LUBRICANT
THAT KILLS HEAT"



"LET YOUR CAR
BE THE JUDGE"

Spedolene is Revolutionizing Automobile Gear Lubrication

If it were possible to reach 100% efficiency in lubrication practice, automobiles would never wear out. **Spedolene** gives the highest efficiency possible to secure in gear lubrication, consequently it makes an automobile last longer and give better service than any other lubricant. From every standpoint, **Spedolene** has proved to be the ideal lubricant for all automobile gears.

Asbestos the Foundation of SPEDOLENE

A lubricant manufactured with asbestos is revolutionary in principle, chiefly because this idea is such a radical departure from ordinary methods. As employed in **Spedolene**, asbestos becomes the foundation of one of the most valuable lubricants ever discovered.

Investigation and trial, either by the engineering expert or the motoring amateur, are sufficient to convince anyone of the practicability, and the superiority, of this foundation. **Spedolene** has revolutionized the gear lubricating problem of the country in less than three years and is unquestionably the greatest success in the shortest period of time in the history of lubrication.

Those Who Are Using SPEDOLENE Find That It

- Will positively eliminate gear noises.
- Will not run out or throw out at axle drums or gear cases.
- Will not gum.
- Will keep the gears cool as well as lubricate them.
- Will last longer than any oil, grease or compound and
- Is not affected in any way by any degree of heat or cold.
- Has no corrosive action, no fats, grease, acids, lye, soda or water.

USED EXTENSIVELY IN FOREIGN COUNTRIES

WHERE YOU CAN GET SPEDOLENE—Spedolene is now sold by progressive dealers in many parts of the country. If you experience any difficulty in securing **Spedolene** from, or through, your regular dealer, we will see that you are supplied, without expense or inconvenience. Ask your dealer or write us.

DEALERS—We are rapidly extending our distributing organization and need an agent in every town, city and state. Write us to-day for full information. Every live automobile dealer and jobber can profitably add **Spedolene** to his stock.



Continental Asbestos Corporation

Manufacturers of Asbestos Lubricants, Etc.

*Spedolene, Journolene, Asbestolene,
Cupolene, Axolene, and Gearolene.*

7-11 Summer Street
WORCESTER, MASS.
U. S. A.



This Shield is on every Package and Barrel.
REGISTERED IN U. S. PATENT OFFICE

When Writing to Advertisers, Please Mention The Automobile Journal.

PUBLISHER'S AND READER'S PAGE

Good Roads and laws are of interest to every automobilist. The Automobile Journal will consistently support all good roads movements and will devote a part of its editorial pages to the endeavors of organizations or of individuals working for good roads. This issue contains a number of timely articles and the Aug. 10 number will have much useful

Manufacturers of motor vehicles are invited to write for the Automobile Journal's specification sheets. These have been carefully compiled and their use insure accuracy in detail entering into descriptions of the new models.

As an Owners' Magazine, The Automobile Journal is second to none. In addition to

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data dealing with this subject as well as much comprehensive touring information.

Readers Are Invited to make use of the Correspondence With the Readers column when in need of information of motor vehicle subjects. When necessary the subjects will be illustrated and the components lettered. Those who do not wish their names published should state this in their communications.

Alcohol as a Fuel for motor vehicles will be discussed in the Aug. 10 issue of The Automobile Journal. The article was compiled by an authority on the subject of fuels and carburetors and will be illustrated with sectional views of devices for carburetting alcohol.

New Models are announced by manufacturers, and in keeping with its policy The Automobile Journal will detail all changes and improvements.

REDUCE THE HIGH COST OF RUNNING YOUR AUTOMOBILE

By Buying Supplies at Less Than Manufacturers' Prices From the Original "Price Wreckers".

WORLD'S LARGEST DEALERS

Every Item in This List a Bargain.
Read every one carefully.

Following is a list of a few of our especially good values. It is not a complete list of our stock. Do not hesitate to call on us if you are in the market for anything not listed.

Schebler Carburetors, 1 1/4-in., model "D" and "L"	\$7.90
Holley Carburetors	2.50
Rayfield Carburetors	6.50
Kingston Carburetors	2.50 to 4.00
Slide Oil Lamps, per pair	2.75
Electric headlights, regularly \$25, our price	per pair 8.00
4 and 6-cylinder Gleanoil imported magnetos, high-tension, regularly \$100 to \$150, our price	15.00 and 20.00
Bosch low-tension magnetos	5.00
Remy magnetos, model "S"	9.00
Spilldorf dual outfits, complete	25.00
Magneto coils	4.00 up
4 and 6-cylinder Connecticut coils	12.00
Storage batteries	8.00 up
Steering columns complete with wheel	15.00
Stewart-Warner and Jones Speedometers	8.00 to 15.50
Velvet shock absorbers	10.00
Monnex shock absorbers, per set of 4	20.00
\$40 Disco starters	5.00
Racing seats, regularly \$50 per pair, our price	15.00 each
1914 Ford runabout bodies	40.00
Roadster bodies	each 30.00
Peerless 7-passenger bodies	35.00
5-passenger fore-door bodies	each 85.00
Axles complete, front and rear	40.00 up
Ford radiators, best quality	17.00
Radiators—Cadillac, Pierce, Knox, Stevens-Duryea, Fiat, Warren, Olds and a hundred others	17.00 to 35.00
Ball bearings, all sizes. Less than one-third	6.00
Round gasoline tanks	2.50
Square gasoline tanks	2.50
Prest-O tanks, Model "B"	13.50 complete
Continental rims	3.00
Dorian rims, all sizes	2.50 and 3.00
Universal joints	5.00
Rear tire holders, 1 or 2 tires	1.75
Electric horns, complete with push button and wire	1.95
\$25.00 trunks	5.00
Tire covers	0.75 and 1.00
\$25.00 windshields	9.50
Mohair dusters	8.50
Chauffeurs' dusters	1.00
Storm fronts and side curtains	1.00
Appleco Lighting System, complete	40.00
Brown-Lipe transmissions	50.00
Top covers	2.50
Tire gauges	0.85
Rollers	1.75
Single, double and triple action pumps	0.75 up

A 1 Tires and Tubes—	
30x3 casings 6.65	Grey tube 2.35
30x3 1/2 casings 9.55	Grey tube 2.95
32x3 1/2 casings 9.65	Grey tube 8.20
34x4 casings 14.65	Grey tube 4.10
36x4 casings 14.85	Grey tube 4.40

Other Sizes in Proportion.
Truck tires, all sizes, \$12.00 to \$25.00 each
Springs, all sizes, at less than 1/2 factory prices.

Motor driven electric horns..... 7.50

We also have such goods as Klaxon horns, Weed chains, Spilldorf Sootless spark plugs, and, in fact, everything for the automobile. Consult us before buying anything in the way of automobiles or supplies and send for our free price wrecker.

Steering Wheels, \$2.50 to \$3.50; Fenders, all sizes, \$1.50 up; Tops, Runabouts and Touring, \$15 up; Lavigne rollers, \$5 to \$7.50; Ford rollers, 5c.; Tool boxes, all sizes, \$1.00 up; Jacks, 65c. up; Tool kits, \$1.25 up; Goggles, 20c. up.

TIMES SQUARE AUTOMOBILE CO.

S. W. Cor. 56th St. and Broadway
1210 Michigan Avenue

New York
Chicago

AUGUST ISSUE

Of The

Accessory and Garage Journal

Will Accord All Advertisers in This Magazine the Greatest Distribution to the Trade Ever Offered Through Any Magazine Devoted to the Automobile Industry.

A Statement Backed by an Iron-clad Guarantee of Trade Service and Circulation.

Claims and Guess Work Eliminated.

**The Accessory
and Garage Journal**

Has No Owners' Clientele

**It Is the Only Strictly
Trade Paper of the
Kind Published.**

**100% QUALITY and QUANTITY
CIRCULATION VALUE EVERY
MONTH.**

\$100 A PAGE SERVICE FOR \$60.

(Until Sept. 1, 1914.)

A TRADE PAPER FOR THE TRADE.

Date of Issue, August 15.

Accessory and Garage Journal's Trade Mailing List

Contains the names of all active concerns in all branches of the Automobile Industry.

If you maintain a trade mailing list department—write to us.

If you use trade names once or several times during the year—write to us.

If you are interested in trade mailing service in any manner or form—write to us.

We can cut your trade mailing list expense in half and give a service that cannot be equalled.

Accessory and Garage Journal

Times Building

Pawtucket, R. I.

Practical Automobile Mechanical Books

A Complete Library



TITLES			10 BOOKS
Engine	.	35c	All indexed
Magneto	.	35c	All complete
Carburetor	.	35c	No theory
Battery	.	35c	All revised
Tires	.	25c	Up to date
Chassis	.	25c	800 pages of text
Lighting	.	50c	1500 illustrations
Operation	.	50c	Including
Overhauling	.	50c	many page charts
Motorcycle	.	35c	and working diagrams.

Money making and saving books for the owner, operator, student, dealer, garageman, supplyman, agent and repairman.

Price complete \$3.75, transportation charges prepaid

Automobile Journal Publishing Company

Times Building

Pawtucket, R. I.

Start a Safety First Society of Your Own-



News item—Ten dead eight hurt in day • auto accident toll.

Above is a cartoon by Weed from the New York Tribune which emphasizes the importance of the following

Motorists

1. Be Considerate
2. Go Slow
 - (a) Passing Children
 - (b) Passing Vehicles
 - (c) Approaching Crossings
 - (d) Around Corners
3. Stop
 - (a) At Railroad Crossings
 - (b) Behind Street Cars Taking on or Discharging Passengers
4. Use Tire Chains on Wet or Slippery Pavements

Better be Safe Than Sorry

Citizens are requested to co-operate with us by sending in the number of any automobile involved in any accident witnessed by them giving their name address and telephone number

Educational Campaign
SAFETY FIRST SOCIETY

Ogden L. Mills, Pres.

501 FIFTH AVENUE

NEW YORK

Follow the vital advice given by the Safety First Society of New York City which appeared in all of the New York newspapers and is reproduced on this page.

Be sure that you follow the advice to use Tire Chains when ever pavements are wet and Slippery.

Use Tire Chains on front tires too, as the front-wheel skid is the most dangerous of all it is the hardest to counteract by manipulation of the steering wheel.

THE AUTOMOBILE JOURNAL

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JULY 25, 1914

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CARE AND MAINTENANCE OF MACADAM ROADS.

Endurance and Economy of Bituminous Surfaced Highways When Constantly Maintained and Systematically Repaired—Methods Necessary for Complete Restoration and Apparatus Necessary to Do Construction and Repair Work.

THE most marked difference between the perfect English roads and American roads in the Northeastern section of the United

States is not the method of construction, but the method of maintenance. developments, the bituminous macadam and bituminous concrete.

Maintenance, on the other hand, tells quite a different story.

States is not the method of construction, but the method of maintenance.

Construction as carried on by the best road builders in the United States is fully as good, if not better, than English construction. This applies not only to the highest priced block and sheet pavements, but to the gravel, macadam and their modern



Columbia Street, Cambridge, Mass., Which Has Traffic of More Than 4000 Vehicles Daily—An Example of Tar Macadam, Built in 1908, and Maintained at Low Annual Cost with Surface Treatments of Tarvis B.

In England the roads have been built and in use for a long period of years. All the problems which arise in the care and maintenance of roads and highways have come up, have been discussed and their best solutions arrived at. Roads are being repaired which to an American seem to be in perfect condition. The Englishman has



Main Highway at Spencer, Mass., a Concrete Pavement Maintained with Surface Coatings of Refined Tar Since 1909.

learned through experience that it pays to replace the broken paving blocks to prevent its neighbor from breaking down; also that it pays to repair the small hole in a macadam in order to stop its enlargement to a big hole.

Americans Neglect Good Roads.

Americans on the other hand have been so busy building new roads that they have in most instances entirely neglected the roads already built. The result has been deplorable. Roads which should be in first class condition need entirely rebuilding at a cost far in excess of the amount that would have been required to keep them in order through systematic maintenance.

The evils of neglected pavements are too well known to need elaboration. The dangers of holes to life, limbs and springs, the gross offence to sight and smell of the collected filth, the more subtle dangers due to unsanitary conditions, have been of frequent note. It might even be said that a neglected street lowers the whole moral and aesthetic tone of a neighborhood.

Another phase of the problem seems to have escaped notice. The neglect of the low cost pavements leads to the demand for higher cost pavements than the

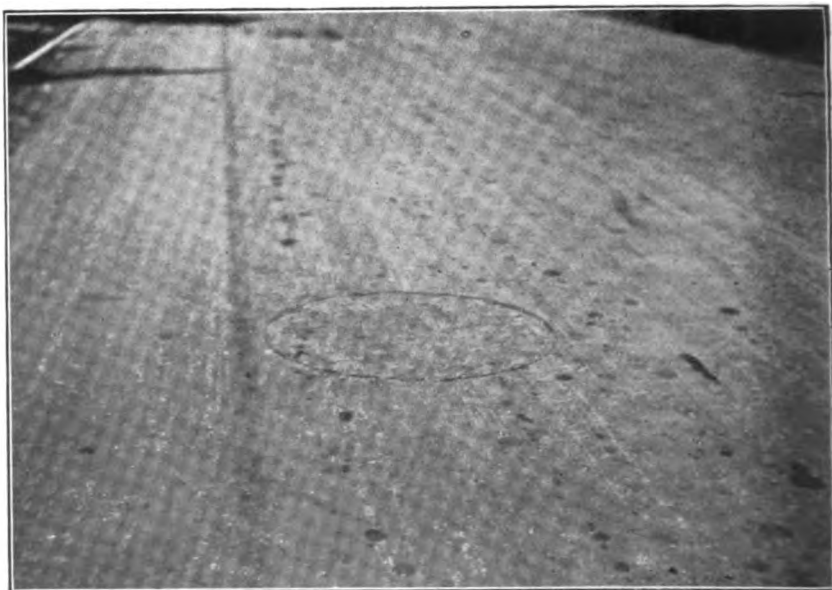
situation warrants or the people affected can afford. The building of high cost pavement also reduces the total mileage possible to build. To take a concrete example:

Governor Glynn of New York lately commended the building of expensive state roads, costing up to \$30,000 a mile, giving figures purporting to show the ultimate economy of this large expenditure. His figures are based, however, on an absurdly high annual maintenance cost for macadam and an equally absurd low maintenance cost for brick. A maintenance cost of \$1000 per year on macadam paving presupposes the previous neglect of the road, while a cost of \$50 per mile on brick neglects the actual costs determined through experience.

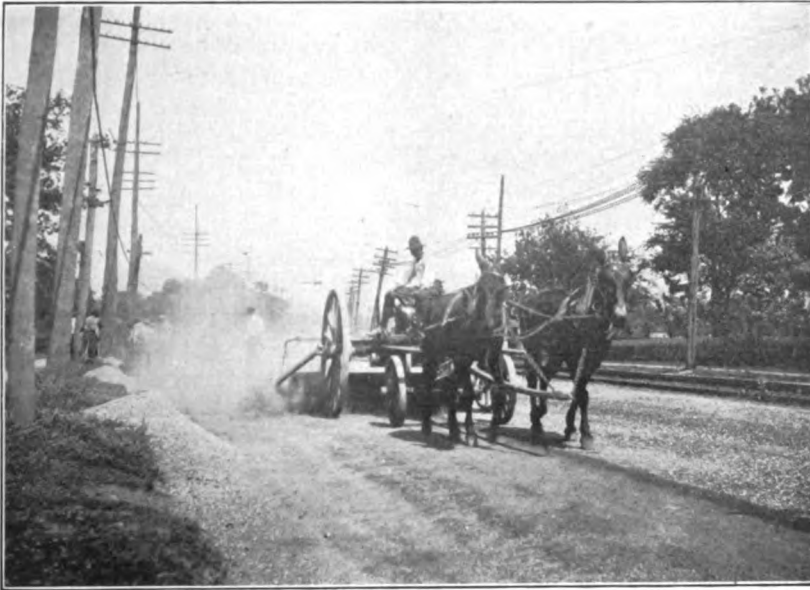
Cuyahoga county, Ohio, the home of the brick pavement, spends nearer \$1000 per mile for maintenance on brick roads, rather than the \$50 claimed by Governor Glynn.

A statement of the actual facts as they exist under New England conditions would be more nearly as follows:

	Brick Paving	Bituminous Macadam
First cost	\$26,400	\$8,000
Interest on investment, at 5%..	1,320	440



Union Avenue, Laconia, N. H.—Note the Manhole Cover Still Flush with the Surface After Three Years' Wear of Heavy Traffic Between Laconia and Lakeport—A Tar Macadam Maintained with Tarvis B.



A Clean Swept Road Is Absolutely Essential to the Successful Application of Thin Coats of Bituminous Material.

Replacement after 20 years.....	20,000	.....
Resurfacing twice in 10 years....	.....	8,800
Annual repairs	500	440
Annual replacement cost.....	1,000	440

In other words, the high cost pavement cost three times the expense of the low cost pavement to build. In the long run it costs as much for repairs, the replacement fund is twice as large, and the interest on the money invested is three times as great.

To look at it in another way, the tar bound macadam can be built at half the original cost, while the maintenance and the sinking fund for renewal can be taken care of by the interest on the difference in cost between the tarvia macadam and the brick.

To state it still another way: Three times the length of road can be built with the same money, and the cost of maintenance of the three miles will not be three times the cost of keeping up the more expensive road. When, in addition to the economic advantages, the aesthetic and practical advantages of a good bituminous macadam are added, it is little to be wondered that New England engineers and road authorities stick to the stone road and its descendents.

The macadam, properly built

and maintained, is pleasing to the eye, is easy to keep clean, is practically noiseless, makes a pleasant street to live upon and is the smoothest and most pleasant of all roads to ride and drive upon. These latter considerations often lead to the construction of bituminous bound roads, even where the difference in cost is not strikingly in favor of the bituminous pavement.

Much of the work in New England with bituminous bound roads has not been new construction from the ground up, but has been in the nature of resurfacing. The bituminous materials lend themselves admirably to this form of work and the many miles built by the state authorities of Massachusetts, Rhode Island and Connecticut

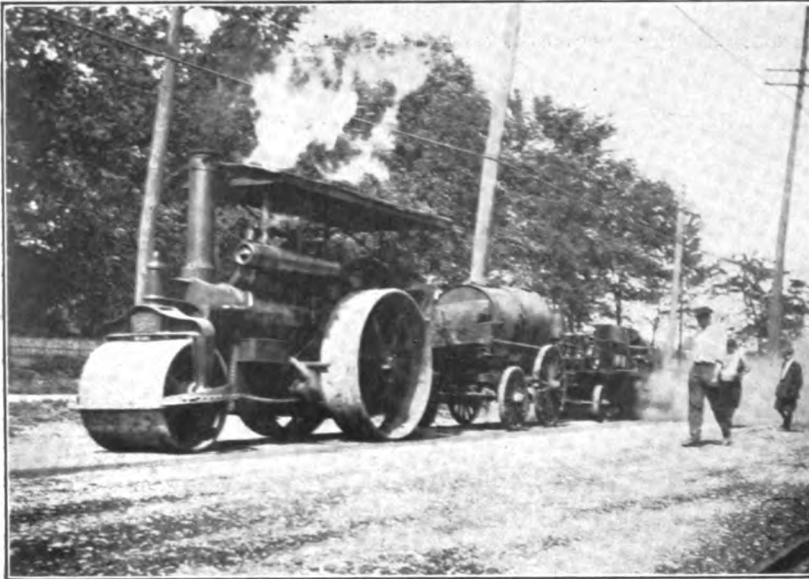
attest to the popularity and serviceability of this kind of work.

General Method of Reconstruction.

The general method of reconstruction of old macadam is to scarify the surface, carefully harrow it to level it and to bring all the stone to the surface. It is then rolled smooth again. Two inches of new stone is now added and rolled until solid. Considerable brains need to be mixed with this preliminary part of the



The Highest Type of Apparatus Developed for Applying Surface Coats of Bituminous Materials, an Automobile Truck Fitted with a Pressure Pump That Sprays Any Compound, Hot or Cold.



The Apparatus Used by Samuel Finley of Atlanta, Ga., for the Distribution of Refined Tar to Road Surfaces.

work. If the stones in the old macadam are badly pulverized and of little value they must be excavated and replaced with new stone.

Firm Base Necessary for the Stone.

On the other hand, the old stone may be so good that the new stone may be reduced very considerably in quantity. In any event, what is required is a good, firm base for the layer of new stone. Unless this is obtained, the new surface to be constructed will not endure to the best advantage. In this resurfacing work it is quite as true as in new construction work that the endurance of the surface of a road is to a large degree dependent on the foundation.

The two inches of new stone must be carefully placed. Merely dumping in piles and levelling them off will not be sufficient. In order to get a smooth riding and evenly wearing road every shovelful of stone must be rehandled from the piles on the road. If the pile is left where dumped, and merely levelled off, the stone that was in the bottom of the pile is more compressed and denser than that which has been knocked from the top of the pile. These differences in compactness show at once when the bituminous binder is sprayed on the road. The more open places drink

in the binder, while the compact places keep it on the surface.

Too much emphasis cannot be placed on absolute uniformity. Lack of it has too often led to a condemnation of the penetration method of constructing and repairing macadam roads. The condemnation should be heaped on the head of the careless and not on the method.

The two inches of stone are carefully compacted by the steam roller. A twelve-ton three-wheel roller is most often used. Great care must be taken to give a good shape to the road by careful rolling, beginning at the sides and working towards the center. The road, after the rolling is finished, should have not more than three-eighths inch crown to the foot.

Since a bituminous macadam road sheds water easily, more than this is unnecessary and tends to make the road slippery. Every stone should be locked into place, and yet the surface should be open to receive the bituminous coat.

Refined tar is most often used as a binder in New England and is put on in a number of different ways to suit local conditions. On small jobs the binder is melted in kettles and poured from hand pouring pots. Larger work calls for



Typical Break in a Bituminous Concrete Caused by a Burned Batch in the Mixer—If Not Repaired It Will Cause the Ruin of the Rest of the Pavement.



Portable Repair Outfit Used by the Massachusetts Highway Commission for Patching Bituminous and Bituminous-Coated Roads.

tank car deliveries and the application of the material from tank wagons or auto trucks. Much time and thought have been given to invention and perfection of devices for spreading bituminous materials. Auto trucks are now in use in the vicinity of Boston which deliver from a central plant up to a distance of 60 miles, and can spray on any amount, from a fraction of a gallon up to two gallons a square yard.

Whatever the method employed, a good penetration and absolute uniformity are essential to good work. A gallon and a half per square yard has given the best success. After the refined tar is spread a sprinkling of five-eighths inch stone is applied to the road and bedded into the surface with the road roller. Here, again, uniformity is essential to success.

The stone must be applied evenly and a quantity used just sufficient to thoroughly chink in the large stone and yet leave no excess on the surface. These details may seem unimportant, but many a road has been ruined by not giving it sufficient thought.

The road is then ready for the seal coat. This is applied in the same way as the first coat of bitumen, but the quantity is reduced to a half gallon per square yard. A covering of pinstone or good gravel and more rolling completes the job.

The method of repair outlined above should be employed on all macadam roads where the surfaces have become so rough as to call for general resurfacing. The method will be found cheaper in the long run than patching and surface treatment where the area to be patched amounts to any considerable percentage of the total surface.

If the surface area of the macadam on the whole is in good condition, but with minor holes and breaks, local patching of the holes, succeeded by surface treatment of bituminous materials, has become the accepted method of repair throughout the New England states. Many of the old macadam roads have been kept

along by this method on the main intercity and interstate highways with markedly good results. Neglecting differences in traffic and in bitumen, the results are directly proportional to the condition of the road at the outset.

Timely Surface Treatments Superior.

Surface tar treatments begun on macadam before the surface had become worn and pitted are markedly superior to surface treatments on worn macadam, no matter how well the repair work has been carried out. In no department of human endeavor does the proverbial stitch in time save more than in the application of bituminous coat-



The General Method of Patching Bituminous Concrete Pavement—Filling in the Holes with Properly Sized Stone.



Patching Gang at Work on Street Surface—Pouring the Hot Refined Tar on the Stone in the Holes to Be Repaired.

ings to macadam and and bituminous macadam before the actual holes develop. Any experienced road man would be willing to agree that it saved ninety-nine patches instead of nine.

Methods for Repairing Tar Paving.

The general method of repairing holes is a modification of the reconstruction method outlined above, and is applicable to all classes of hard surfaced roads, macadam, bituminous macadam, concrete and asphalt.

The holes must be cleaned out to a fine edge and must be dry when the patching is done. A thin coating of refined tar is painted over the hole and its edges. Stone is then put in the hole of such a size that a single stone will reach from the top to the bottom of the hole. In practise the repair gang carries in a cart a number of different sizes of stone. The largest sized stone carried is two and a half inch. In case these larger stones are used a few stones of smaller size are sprinkled over the top to key in the large stones.

A light coat of refined tar is then spread on the patch and tamped or rolled until solid. The making of these patches is a fine art in itself. When well done, they are perfectly level with the old road and, if on a bituminous macadam, cannot be distin-

guished from the original road.

In order to make the surface uniform, and as an economy of maintenance, it is now customary to follow the patching by a surface coat of bituminous material. The kind of material and the amount are determined by the character of the road. The main macadam roads of the Metropolitan Park system of Boston have been kept up for many years with a refined tar applied hot. Many cities and towns, however, find for this class of roads and traffic that the cold application of refined tar is cheaper and very effective.

The economy of effective patching and of surface coating for automobile travelled roads is just beginning to be felt. On certain roads leading out of Paris

this replacement was formerly required every two years. With surface tarring and automobiles the rebuilding has been deferred to four or more years.

With other roads it pays better to spend a few cents a yard each year than a large amount per yard every few years. By these surface applications the roads are not only preserved, but are made dustless and attractive to travel.

The economical application of surface coatings of refined tar has led to the development of many types of apparatus for spreading them.



Finishing the Filling of the Hole with Stone Screening Preparatory to Consolidation by Hand Tamping.

Where extensive work is done, as in the vicinity of Boston, and on the Maryland state roads, the efficiency of automobile trucks equipped with apparatuses especially designed to afford uniform distribution of variable quantities over given surfaces has been fully demonstrated. Trucks specially equipped are now built so that they will distribute by spraying any volume of material from a fifth of a gallon up to two gallons per square yard. These automobile equipments will also handle both hot and cold refined tar products up to a radius of 60 miles from a central plant, or can be used to pump material from a locally placed tank car.

For smaller work horse drawn outfits are available for handling cold material, and spreaders drawn by road rollers or traction engines can be utilized for hot materials. To describe these apparatuses in detail would require an article in itself. Suffice it to say that they have been perfected for all classes of work, and that the road authorities need not hesitate to adopt this form of treatment for lack of proper apparatus for applying the bituminous materials.

BOYCOTT ERIE RAILROAD.

President Underwood's Attack Forces Abbott Company to This Action.

The statement made by President Underwood of the Erie Railroad Company, blaming moving pictures and the "automobile craze" for the business depression experienced in some sections of the country of late, has caused the Abbott Motor Car Company of Detroit, to boycott the Erie. In an order issued, M. J. Hammers, vice-president, of the Abbott Company, characterizes President Underwood's statement as being unwarranted and manifestly unfair to the automobile manufacturers in particular, to the city of Detroit in general, and especially to the several hundred thousand skilled working people and their families who find in the automobile industry a worthy and satisfactory means of livelihood.

Mr. Hammers then pointed out that since the organization of the Abbott Company a few years ago the freight and express business it has done has amounted to 9000 carloads of freight and 430,000 parcels. Stating that the company believes this traffic in the future should be sent over railroads that maintain policies constructive in things the company is concerned in, he ordered that until further notice all freight and express shipments be routed other than those of the Erie

Railroad, which order has been observed.

President Underwood now says his statement was misconstrued.

BOARDS REJECT 'BUSES.

As the height of the bodies of omnibuses which promoters hoped to operate in Chicago boulevards was such that the lower branches of the trees shading these ways would need be cut away to permit free passage, and that there was fear that the machines, because of long wheel-base, would cause congestion of traffic, the joint committee of three park boards having jurisdiction of the boulevard system voted unanimously to refuse a petition for franchise to operate several lines of machines. The pleasure of the users of vehicles was regarded as paramount to the convenience of the people who might use the omnibus service.

\$10,000 FOR DESERT RACE WINNER.

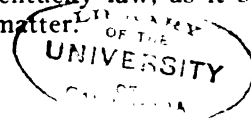
At a meeting recently at Bisbee, Ariz., it was decided that the prize of this year's desert race from Phoenix, Ariz., to El Paso, Tex., will be \$10,000. Last year the prize was \$6000. The race will take place Nov. 6 to 9 and the cars will pass through the cities of Chandler, Tempe, Mesa, Florence, Tuscan, Bisbee and Douglas. George T. Peabody of Chandler will print 25,000 copies of a booklet containing photographs, route descriptions and a map which will be circulated for advertising purposes.

NEW ORLEANS RETURNS FEES.

The Louisiana legislature recently enacted the Davey law, which became effective immediately, and as this prohibits licensing of motor vehicles by municipalities, the city of New Orleans was compelled to refund to all owners of motor vehicles the fees exacted for the licensing of the machines by the city. The fees were returned in the form of checks through the secretary of the board of examiners.

MUST SALESMEN BE REGISTERED?

A question now before Attorney-General Garnett of Kentucky is whether a salesman whose firm supplies him with an automobile instead of a mileage book for railroads, is required by law to pass an examination as a chauffeur and be registered as such. The Kentucky law, as it stands, is not explicit on this matter.



SALEM FIRE TESTS MOTOR APPARATUS.

Largest Number of Machines in Departmental Use Ever in Actual Service Demonstrate Efficiency and Endurance Far Beyond Normal Requirements.

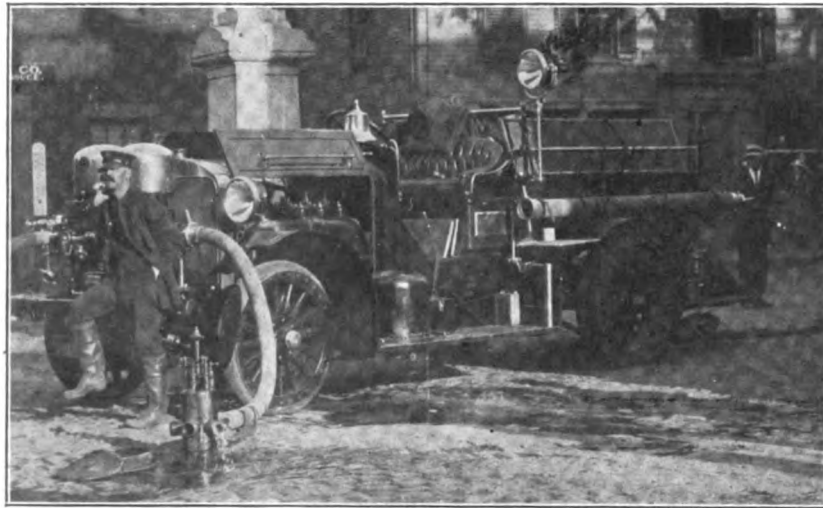
THE Salem fire disaster, June 25-26, gave motor fire apparatus the hardest service and efficiency test such equipment has ever been given, and in every work during the conflagration the machines demonstrated remarkable capacities.

Many appeals for assistance were sent out from the stricken city between 1:45 and 6:30 P. M. on June 25, and, in all, 52 different fire apparatuses responded, 29 of which were motor driven, bringing together for actual service the greatest number of motor fire fighting machines ever in use in New England, and possibly in

Packard that pulled a steam pump from Winchester, a distance of 20 miles, in an hour and 40 minutes. In both instances the hauls were impossible for horses, and considering the difficult operation of pulling a huge steam pump behind a truck, through streets and congested traffic, the machines made exceptionally good time.

Analyzing the records made by the motor fire apparatus, during the entire period of action, the results shown are especially noteworthy. A La France combination chemical and hose wagon of the Boston department started over the road at the same time two two-horse steam pumps and two hose wagons were sent over to the Boston & Maine freight yard at Charlestown to be shipped by special train. The motor driven machine made the 14½ miles in 23 minutes, and the crew was at work in Salem before the other equipment was started. In addition to this, it was necessary to unload the horse apparatus by hand on its arrival, which required not only considerable time, but was hazardous for the safety of the apparatus, owing to the lack of facilities and the inexperience of the volunteers.

The Cambridge department was asked for assistance the



The Ahrens-Fox Motor Pump of the Lynn Fire Department, Which Pumped Continuously for 17 Hours and 30 Minutes.

any single instance in America.

Of the motor apparatus at the fire there were eight American-La France make, eight Knox, two Seagrave, two American & British, one Robinson, one Webb, one Ahrens-Fox, one Fore River Ship Building Company, one Federal, one Christie, one Knox-Martin, one Chalmers and one Pope-Hartford. These included four tractors.

In addition to these, three trucks hauled horse-drawn steam pumps to the fire. One of these was a Packard, owned by the Paine Furniture Company, Boston, and it drew a steam pump 11 miles from Manchester. Another was a three-ton

morning following the fire, and a Knox combination wagon was sent over the road, 23 miles, in 46 minutes. This machine carried 19 men and passed through heavy traffic, showing an average of 30 miles per hour. The Lynn department received the first call at 1:55, and an Ahrens-Fox pumping engine was despatched immediately. This machine covered the four and a half miles in 12 minutes, carrying 12 men. A Seagrave combination wagon with a crew of four, made the distance from Lynn in nine minutes when the second call was given. A Knox-Martin tractor, with a ladder truck, made the same run



Removing Orphans and Attendants From a Burning Orphanage to a Place of Safety in a White Omnibus.

in 14 minutes with 14 men, and an American & British gasoline-electric tractor, with a steam fire pump, made this distance and the men were at work in 14 minutes. Despite the fact that the roads were thronged with motorists journeying to Salem to witness the fire, the tractor-drawn machines made an average of 19.1 miles per hour.

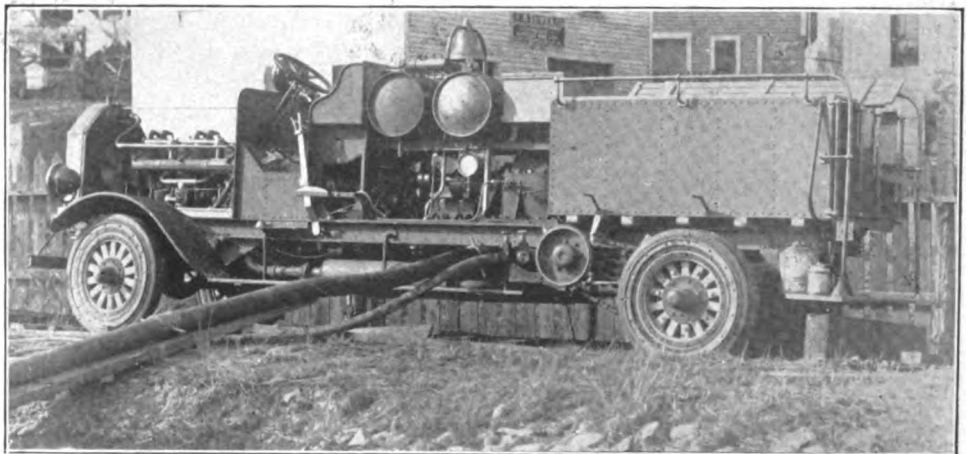
The real work of the motor apparatus began after the record breaking trip to the city. A remarkable service was rendered by the giant pump of the Fore River Ship Building Company. This is the largest fire pump ever built and has a capacity of 1,800 gallons a minute. The machine has a six-cylinder motor of 150 horsepower, and a speed of 40 miles per hour. This machine worked at the fire for 17 hours and 30 minutes and had as many as eight lines of hose working at one time. On the morning of June 25, this outfit had been sent to Manchester, N. H., and had worked continuously at a fire from 2 to 11 in the morning. The crew was returning to Quincy, Mass., when the call for assistance was received at Stoneham. This big machine supplied water for the crews of the combination wagons from Medford, Revere, Stoneham and for other apparatus. Being merely a

demonstrating crew and not attached to a department, no special record of the service appears in any report, other than the praise that was given by the commanders who worked their men from it.

The time of service of the machines varied greatly because of the frequent changes necessary. The Marblehead engine was coupled to three different hydrants before water could be obtained, and while the crew worked 15 hours and 15 minutes, not all of the time was the machine pumping. Nine changes in all were made by this squad.

The Peabody men, with steam pumps, were worked for 20 hours and five minutes, and the Lynn crew with the Ahrens-Fox engine, for 19 hours and 36 minutes, this machine pumping continuously for 17 hours and 30 minutes. During that time the engine used 55 gallons of gasoline and three gallons of oil. The Robinson pump of the Chelsea department was in service 10 hours and 30 minutes and compelled to make six changes, losing 500 feet of hose to save the engine from being trapped by fire. Several times the engine could draw only enough water for a single line of hose. The Seagrave combination was changed three times. The Knox combination wagon of the Danvers department was in service 13 hours, and during that time made seven changes of location.

A run of 11 miles in 16 minutes was made by the Knox combination wagon from Manchester.



The Giant Pump of the Fore River Ship Building Company With a Capacity of 1,700 Gallons a Minute. This Pump Rendered Remarkable Service.



A Coal Yard and Surrounding Property Entirely Enveloped by Flames, Showing Destructiveness of Flames.

This machine carried a large crew of men and was on duty for 12 hours, making six changes. The Knox triple combination engine from Reading was nearly an hour finding water, and then located a stagnant pool and drafted through 20 feet of suction hose and forced it 1,000 feet for five and a half hours. Later the company was located at a hydrant and laid two lines of 1,000 feet each, and pumped steadily for five hours. This machine used 40 gallons of gasoline and six quarts of oil.

The La France engine from Swampscott made the run to Salem, 6.1 miles, in nine minutes and 45 seconds. It started with four lines of hose, but after vainly working for a half hour, during which time the compound gauge showed 20 inches of vacuum because of lack of water in the main, changed to another location, where it worked two lines of hose nine hours and 15 min-

utes, having abundance of water. A change was then made and the pump worked four hours and 21 minutes with one line, and the fourth shift was for a single line for one hour and 25 minutes. The total pumpage for this machine was 15 hours and 31 minutes and the engine was run continuously for 17 hours and 21 minutes. Before the start for Salem the motor was run two hours and six minutes at three different fires. The Christie tractor from Somerville broke a thrust bearing and was towed into Salem by a truck, and then the steam pump was worked for eight hours steadily. The long run, 19.5 miles, was an unusual test, and despite an auxiliary water tank the machine heated the water in the radiator to such an extent that renewal of water was necessary twice, and the escaping steam and hot water was blown back over the machine, so that the crew was forced to stop and cool the water to protect themselves.

A summary of the apparatus of the motor driven type responding to Salem's call for aid shows that Boston, Beverly, Cambridge, Chelsea, Danvers, Everett, Lynn, Malden, Manchester, Medford, Revere, Winchester, Somerville and Stoneham sent combination hose and chemical wagons; Chelsea, Marblehead, Reading and Wakefield sent triple combination pumps, hose and chemical machines; Lynn and Swampscott sent motor pumps; Lynn a Federal hose wagon; and

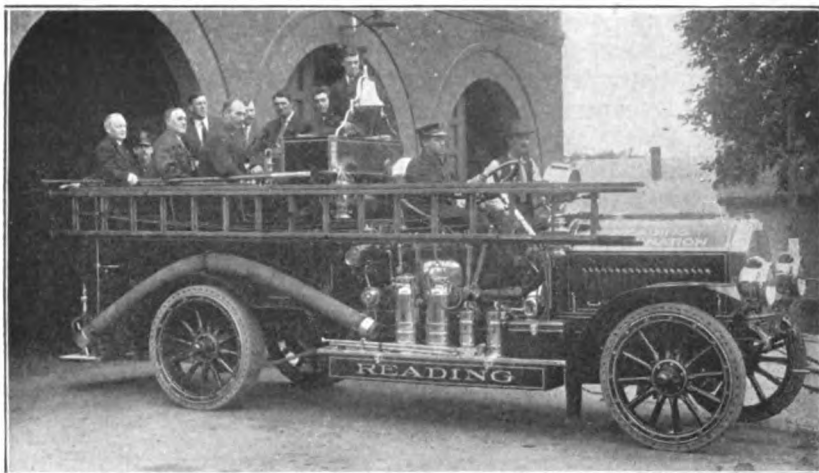


Panoramic View of Devastated Section of Salem, Showing the Large Area of City That Was Flame Swept—The Unusual Combination of Conditions Contributing to the

Lynn, Somerville and Beverly sent tractor-drawn steam pumps, and Lynn a tractor-drawn ladder truck, as well as two chief's cars. Salem had one combination hose and chemical wagon. The steam fire pumps were, aside from the five from Boston, and two from Gloucester, sent over the road, two coming from Peabody, and one each from Malden, Manchester, Marblehead and Winchester. A Medford steamer was sent to Malden to be shipped by train, but was held at the freight yard because of advice that it could not be used from scarcity of water.

The driving distances were far in excess of what fire apparatus is usually required to do in suburban service. The mileages of the relief equipment sent by road were as follows: Boston, 14.8; Cambridge, 23; Chelsea, 15; Danvers, 4; Gloucester, 15; Lynn, 4.5; Everett, 14.2; Malden, 14; Manchester, 11; Marblehead, 4.5; Medford, 18; Peabody, 2; Reading, 13; Revere, 12; Somerville, 19.5; Stoneham, 12; Swampscott, 6; Wakefield, 12, and Winchester, 20.

Commanders of the different attachments reported that some of the work of the motor fire apparatus was quite beyond what any machine might be expected to endure in service, yet without exception the engines demonstrated capacity absolutely convincing of their efficiency and endurance. According to an authority the work of



The Knox Triple Combination Apparatus, Which Was Sent to Salem from Reading and Worked 10 Hours and 30 Minutes.

the different motor apparatus at the Salem fire show conclusively that the machines have been developed to a point where they are not only dependable as steam apparatus, but they have other qualities that are immeasurably superior to any other form of fire equipment that has been produced.

In addition to the fire apparatus motor trucks were worked in invaluable service throughout the period of the fire and for days following. The militia used a White truck to great advantage in distributing supplies to the homeless after the disaster. During the fire a White passenger omnibus was used to remove the orphans and their attendants to a place of safety from a burning orphanage.

As for the fire itself, careful estimate shows



Fire Burnt in a Crescent Shape and Practically Wiped Out the Wooden Dwellings, Shops and Factories—An Conflagration, Which Burned Unchecked for Hours.

that 253 acres of the city, closely built with dwellings, shops, factories, mills and varying types of structures were devastated, the destruction being generally complete. Salem is a city of nearly 50,000 people, situated on the water front, and on a long peninsular between two arms of the sea. The city has developed westward and it is surrounded by Marblehead, Lynn, Peabody, Danvers and, across the inlet at the north side of the city is Beverly. The inlet between Beverly and Salem is spanned by the Boston & Maine railroad bridges and the regular highway bridges, so that there is direct communication between the two either by train or by road.

The conflagration was spectacular and terrifying in the rapidity of its spread, and, fanned by a strong wind, as well as by a draft created by the upward movement of the atmosphere caused by the flames, it developed a forward movement that could not be faced. The fire started in the patent leather factory of Korn & Company, in the heart of the thickly populated wooden dwellings. From this point the flames swept a mile to the railroad tracks in less than an hour and a half.

RUSSIAN AUTOMOBILE PROGRESS.

The figures given below, recently published by Russian authorities, give an idea of the increased use of the automobile in Russia.

During 1901, only 40 automobiles and seven motorcycles were imported; in 1906, the imports aggregated 243 cars and 380 motorcycles, and five years later, the number of cars was 2117 and of motorcycles 1134. The imports of motor cars and cycles during the first seven months of 1911 totaled in value \$3,400,000, during 1912 \$4,000,000, and during the following year \$6,000,000. Of 1844 automobiles and 792 motorcycles imported into Russia during 1910, Germany supplied 1247 cars and 582 cycles, France 385 and 56, respectively, England 86 and 18, United States 49 and one, and Italy 20 and nine. Complete automobiles imported pay \$88 duty, if accommodating four or more passengers; cars for three or less passengers pay \$56. Chassis are taxed at five per cent. of their values.

PRINCESS COMPANY STARTS AUGUST 1.

The Princess Motor Car Company, Detroit, Mich., one of the newly organized concerns of that city, has taken lease of a building at 348

Clay avenue, and plans to start operations August 1. The company has capital stock of \$100,000. The ultimate purpose is to triple the 10,000 square feet of floor space now available for manufacturing.

The company will it is stated, produce 100 cars a month for the balance of the year. The officers are: C. D. Smith, president; W. H. Brennan, vice president; I. N. White, secretary and general sales agent, and O. C. White, purchasing agent and general manager.

MARKET FOR AMERICAN CLOCKS.

According to the American Consul in Breslau, Silesia, Germany, Germany offers excellent opportunities for marketing the products of American automobile clock makers. Not only is there a wide call for these articles as part of the regular equipment, but automobile supply houses frequently carry a large stock and sell a good many automobile clocks. Some eight-day clocks sell for as little as \$3.57.

FORD ADDS TO FACTORY.

The Ford Motor Car Company has started work on an eight story addition to its factory at Jackson avenue and Honeywell street, Long Island City, New York. The cost will be \$650,000.

JAILED FOR BORROWING CAR.

For taking a car from a garage without the permission of either the owner or the garage manager, an employe of the Park Avenue Garage, Bridgeport, Conn., was sentenced four months in jail.

AERO CHART OF WORLD.

The Aero Club of America has appointed a committee to make an aeronautical map of the world, and to establish a chain of landing stations for water and land aeroplanes.

PROHIBIT ELECTRIC HORNS.

Maryland has prohibited the use of electric horns at night, and motorists not equipped with bulb horns are arrested and fined \$1 and costs, a total of \$2.45.

BOSCH PRODUCTS READY.

The Bosch Magneto Company, New York City, announces that the various new Bosch electrical products, including the Bosch lighting and starting systems, which have been in the market for some time, are now ready for quantity deliveries.

JEFFERY CAR POPULAR ABROAD.

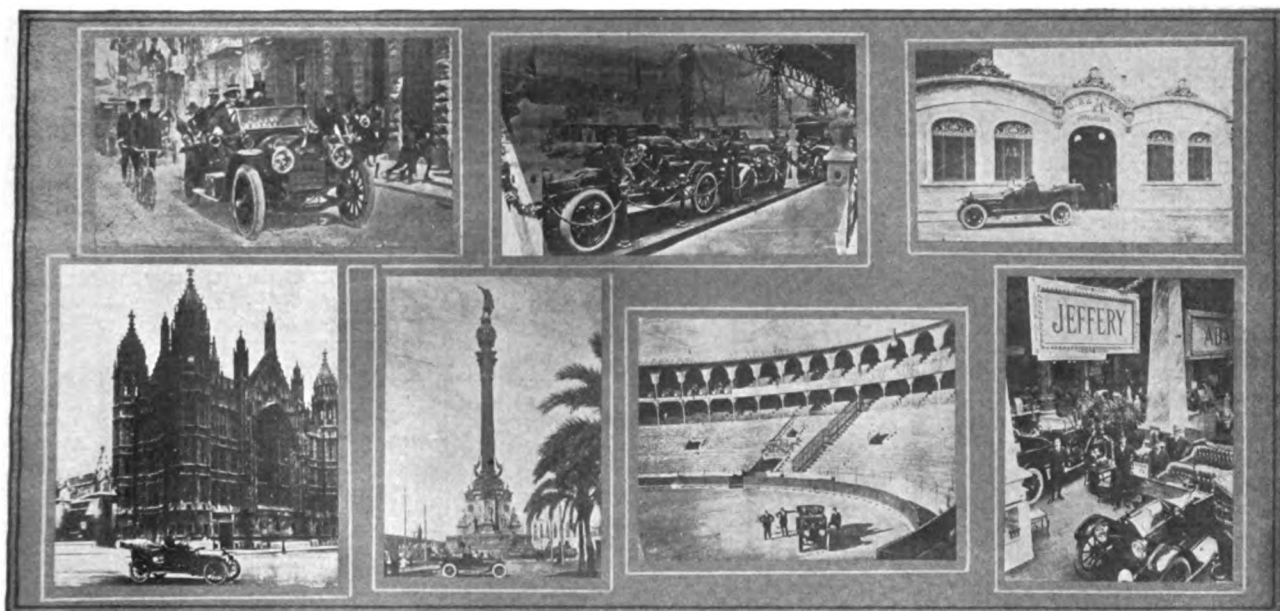
That the Jeffery car, made by the Thomas B. Jeffery Company, Kenosha, Wis., is popular abroad is indicated by the accompanying photographs. In the upper left picture the King of Italy is seen riding in a Jeffery car, the center

tion between the state of Wisconsin, and the city of Waupun to secure the use of convict labor on the public highways. Wisconsin's progress in this direction has been hampered heretofore by lack of legislation permitting an indeterminate sentence to be imposed upon convicted criminals.

A strip of road 15 feet wide and two miles and a half long has been mapped out for the first stretch to be improved. This road extends from Waupun, which is the home of the Shaler vulcanizers, to Chester.

SCHROEDER'S PEUGEOT ENTERED.

The Peugeot car which, driven by Jules Goux, finished first in the 1913 500-mile race at Indian-



The Jeffery Cars Are Generally Used and Are Favorably Known Abroad, These Illustrations Being of "Sixes" in England, Spain, France and Russia.

view shows a Jeffery machine at the St. Petersburg show, and the upper right illustration is that of a Jeffery six before J. Reyne's establishment, Barcelona, Spain.

The lower row, reading from left to right, show Jeffery cars before the House of Lords at London, Eng.; before the Statue of Columbus at Barcelona, Spain; in the bull ring at Barcelona, Spain, and at the Paris automobile show.

CONVICT LABOR FOR ROADS.

M. E. Faber, manager of the C. A. Shaler Company, acting as secretary of the Waupun, Wis., Advancement Association, has been instrumental in securing the necessary co-opera-

apolis, was the first entry received for the Elgin races, Aug. 21 to 22. The car was entered by E. J. Schroeder of New York City, who in former years backed Ralph de Palma, but he has named no driver for the car as yet.

TIRE VULCANIZERS IN FAVOR.

C. R. Quine, sales manager of the Williams Foundry & Machine Company, Akron, O., states that 30 tire manufacturers have adopted and now use the Akron-Williams tire repair vulcanizers. The Ford Motor Company recently ordered 14 A-W plants for distribution among its accessory stations.

MARSH TO BUILD CAESAR CAR.

Veteran Designer Leaves Vulcan Company and Organizes New Concern.

A. R. Marsh, designer of the Vulcan car and organizer of the Vulcan Manufacturing Company, Painesville, O., has disposed of his interests in that company and is now located in Anderson, Ind., where he is organizing a company to build a light car. The new car will be named the Caesar and that early deliveries may be made contracts have been made for a large stack of components to be made to Mr. Marsh's designs.

Mr. Marsh is a pioneer in the automobile industry. As a manufacturer of motorcycles he made and marketed the Marsh machine in 1899, which is claimed to have been the first motor bicycle produced in this country. Charles H. Metz of the Metz Company, maker of the Metz car, was then associated with Mr. Marsh as a partner.

In 1907 Mr. Marsh disposed of his interests in the American Motor Company, maker of the M. M. motorcycle, to his brother, W. T. Marsh, and commenced experimental work in light automobiles. Since that time he has designed and built seven distinct machines of the light car type, including the Vulcan.

NEED LAWS FOR AUTO THIEVES.

Job H. Lippincott, State Motor Vehicle Commissioner of New Jersey, says the state laws need changing to deal with the criminal element that is now specializing auto stealing, as, he states, the present statutes are inadequate. Commissioner Lippincott tells of investigations which convince him that numerous bands of thieves not only systematically steal automobiles but will only drive away certain makes. This is, he says, because the fences where the machines are disposed of have bodies for these cars, and consequently the work of changing the equipment, raising or obliterating the engine numbers, etc., is simplified.

WORLD'S RUBBER PRODUCTION.

According to the Goodyear Tire & Rubber Company, a leading London rubber man who recently visited the Goodyear plant estimated that for 1914 the world's rubber production would be: Plantation 65,000 tons; Brazil wild, 32,000 and other wild 10,000 tons. He claims that within a few years plantation rubber will almost

wholly supersede the wild supply. The wild supply, however, has certain qualities that will always make necessary the use of considerable quantities of this staple.

FARMERS OPPOSE ROAD LAW.

Farmers and their organization in Pennsylvania demand that all candidates for the Legislature place themselves on record before election as opposing the present automobile road act. This law bars all traction engines and threshing machines from improved roads, and, according to the farmers, makes useless \$7,000,000 worth of threshing machinery.

COLGATE'S MECHANICS' SOAP PASTE.

Colgate & Company, 199 Fulton street, New York City, manufactures Colgate's Mechanics' Soap Paste, a special preparation for cleaning the hands. This cleanser, which will thoroughly remove grime and grease, will not injure the skin. It is pleasantly perfumed. Department 22 of the company will send a sample to any motorist upon receipt of two cents.

WALPOLE TIRE SALE DEFERRED.

The United States District Court has changed the original order for the sale of the Walpole Tire & Rubber Company, Walpole, Mass., and set the date for the sale for August 12. This was done at the request of the stockholders' organization committee, which is arranging to bid in the property.

OVERLANDS IN ICELAND.

The automobile is now in use in the land of ice. The Willys-Overland Company has sold three cars through its agency at Reykjavik, Iceland. These are the first machines ever operated in the land of the Northern Lights.

HAVERS PLANT SUFFERS FIRE LOSS.

The Havers Motor Car Company's main plant at Port Huron was recently destroyed by fire, the origin of which is unknown. The loss is estimated at \$60,000. Several finished cars, as well as bodies, chassis and parts were destroyed.

FEATURES OF 1915 KING TOURING CAR.

FROM the standpoint of the driver's comfort and convenience, the 1915 Model C King Car, is highly developed, both in design and construction. All the operating devices are so grouped that the driver has every means of control instantly available.

The changes in the new model include an increase of 1-16 inch in the bore of the engine, the substitution of the Atwater Kent igniter for magneto ignition, elimination of the straight dash between the bonnet and the cowl, and the use of a pressed steel rear axle housing.

The cantilever rear spring suspension, which has always been a King feature of construction, is continued. The unit power plant is an L head type, and the block cast cylinders are 3 5-16 inch bore and five inch stroke. The crank case is an aluminum alloy. The three crankshaft bearings are 1 11-16 inches diameter. The main bearing lengths are: Front, 3 1-8 inches; middle, three inches; rear, four inches; the connecting rod big end bearings are 2 5-8 inches length. The valves are 1 13-16 inches diameter, fully enclosed and are operated by roller push rods.

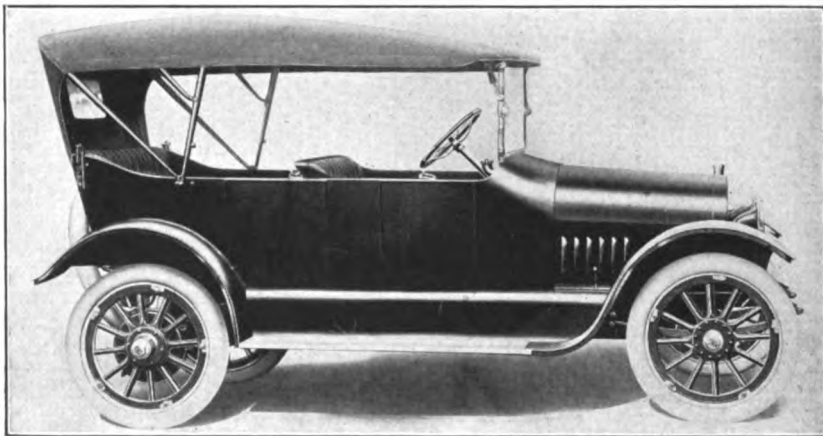
A specially designed carburetor is used. The gasoline is carried in a tank in the cowl, which allows a high carburetor position, affording accessibility and freedom from condensation in the short inlet pipe. The lubricating oil is circulated by the fly wheel to the crankshaft bearings, overflowing to oil pockets from which all other parts of the motor are lubricated by splash. The motor is cooled by water circulated through a honeycomb radiator by thermal action. A six-blade pressed steel fan insures complete circulation of air through the radiator and about the engine.

All operating devices on the Model C are grouped on an instrument board within easy reach and directly under the eye of the driver. The electric light switch, ignition switch and speedometer are lighted by a small electric lamp, which also lights the driver's section of the car. As shown in the accompanying photograph of the instrument board, the gasoline filler cap is located at the extreme right of the group where it

is most accessible. The gasoline gauge is directly beneath the filler cap, and the petcock of the feeder to the carburetor is within easy reach of the driver.

An improved Ward-Leonard starting and lighting system is fitted as extra equipment. It is a motor-generator, the drive being direct to the fly wheel, this arrangement eliminating one set of reduction gears. The improved starter is now operated by a lever instead of the push button as in Model B. The new starter is regarded as being much safer as it is only necessary to push the lever about two inches, and it automatically resumes a neutral position after the motor has been started.

A full floating rear axle is provided in this



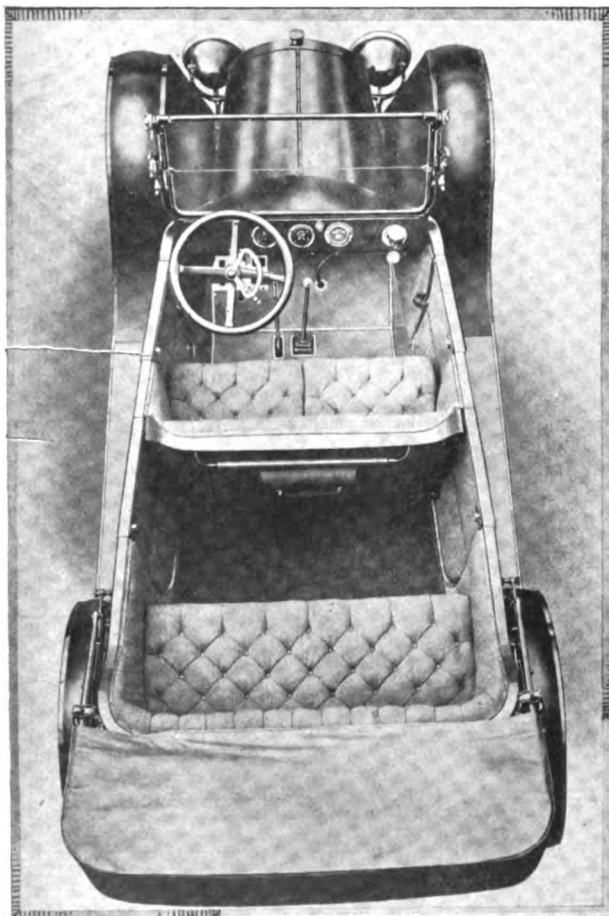
Streamline Body of the 1915 King Touring Car, the Cowl Replacing the Straight Dash of the Previous Types.

model, this type being claimed to be superior to any other. The axle itself has a pressed steel housing, and drive shafts can be removed by merely taking off the hub flange nuts. A saving of 50 pounds in weight has been made by providing a pressed instead of a cast steel housing. The bevel gear ratio is optional, either 3 7-10 to 1 or 4 to 1. Both sets of brakes operate on 14-inch drums at the rear wheels, the expending set being operated by a hand lever.

The multiple disc clutch consists of eight bronze driving plates, each containing 40 cork inserts, and nine steel driven discs. It runs in motor oil supplied by an overflow of the reservoir in the motor base. The sliding gear transmission has 6-8 pitch gears with 7-8 inch face, which are carried on shafts mounted on Hyatt roller bearings. The control lever is slightly

shorter than on the Model B.

The drive to the rear axle is through a Spicer universal joint and one enclosed propeller shaft with a sliding joint. The steering gear is of the Gemmer irreversible worm and gear type. Fastened to the steering column is a small control



which cuts off the air from the carburetor and gives a rich mixture to the motor for starting.

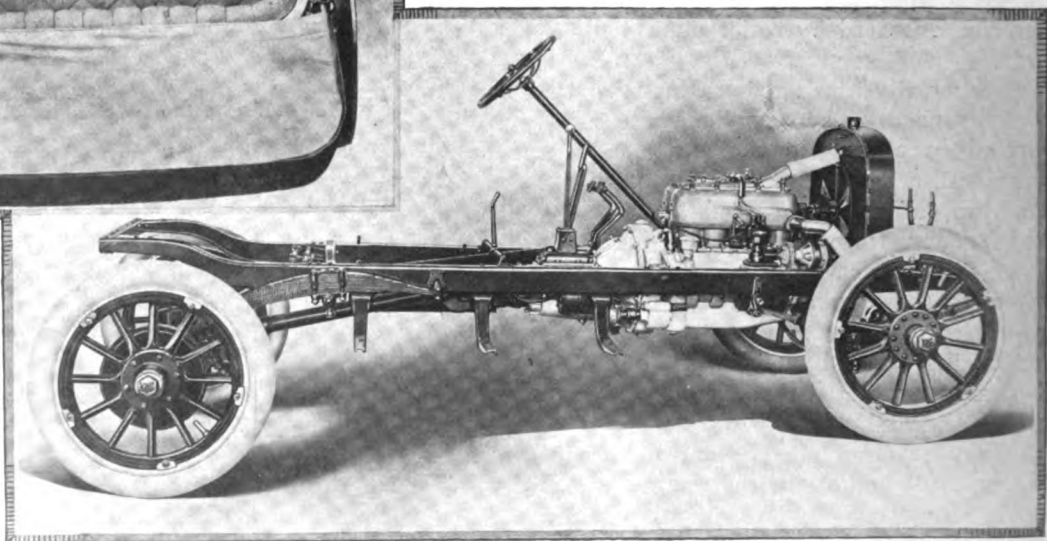
The wheels are of the artillery type, second growth hickory, and are fitted with 33 by 4 inch Goodyear No-rim-cut tires on demountable rims. The standard 56-inch tread or 60-inch Southern tread will be furnished. The wheel base is 113 inches. An extra tire is carried in the rear.

The front springs are of the standard semi-elliptic type, but, as stated above, the rear springs are of the cantilever form. This cantilever spring is set at right angles to the direction taken by resisting forces caused by road shocks. The front end of the spring is attached to the frame by a slotted bracket, which permits freedom of movement endwise, but does not allow transverse motion. The rear end is attached to the tube enclosing the rear axle shaft. An extra leaf on the under side of each rear spring prevents excessive rebound.

The choice of either a five-passenger touring or a two-passenger roadster body is offered for the one chassis. New bodies of the stream line form have been designed. A choice of either leather or corded fabric is given, and the backs of the seats are piped instead of tufted.

A rain vision, ventilating windshield is built into the cowl construction, and a one-man top has been added to the up-to-date equipment. Side lights have been eliminated, extra bulbs in the head lights taking their place. In addition to the above, quick attachable curtains, a Stewart-Warner speedometer, an electric horn, tire irons, pump, jack, tire repair outfit, tools and an extra rim are part of the regular King outfit.

The electric lighting equipment of the car is designed to preserve the lines of the body and to obtain an appearance that is especially desirable,



Features of the 1915 King Car: Upper Illustration Shows the Seating Arrangement of the Body, and the Lower a Side View of the Chassis.

but had not been possible with previous constructions. The electric current for lighting the car is supplied from an 80 ampere hour Willard storage battery that is suspended from the chassis, directly under the front seat, where it is

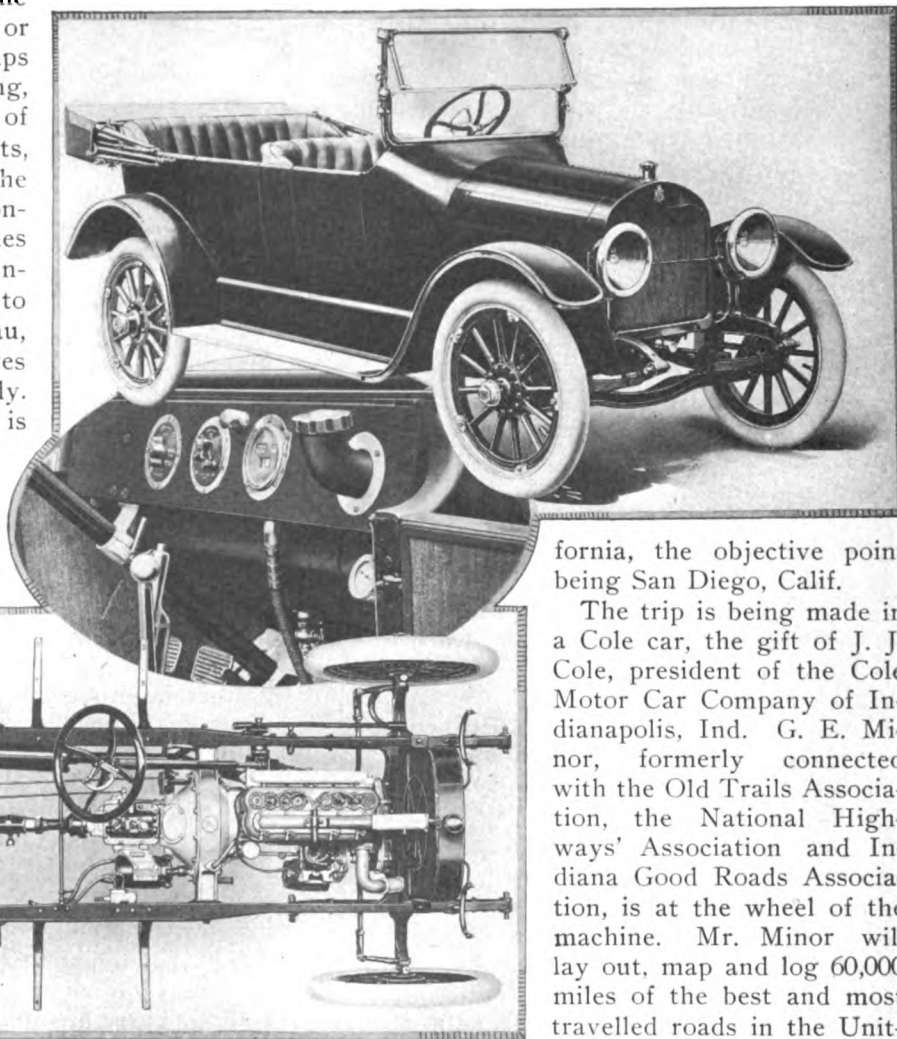
convenient for examination and attention and may be easily installed or removed.

The car is fitted with a pair of 11-inch search lamps that are mounted on brackets. The lamps are of the two-bulb type, with a set of small bulbs so installed that these may be used at will by a switch, so that the power of the lighting may be increased or diminished according to the needs of the traffic or the condition of the streets or highways. The smaller lamps may be used for city driving, this obviating the need of supplementary dash lights, and besides minimizing the current used and better conserving the battery, the lines of the cars are preserved unobstructed from radiator to the rear of the tonneau, which decidedly improves the appearance of the body. Incidentally the equipment is simplified throughout by this manner of installation.

The arrangement of the body is exceedingly satisfactory, for provision is

STANDARDIZED ROADS CAR OUT.

A good roads car representing the Society of Road Standardization of America has begun its first journey, in the interests of standardized roads, leaving Chicago for the Pacific Coast. The initial trip will cover seven states, Illinois, Missouri, Kansas, Colorado, Utah, Nevada and Cali-



Characteristics of the King Car: Upper Illustration is a Three-Quarters View from the Front; Centre Insert Shows the Instrument at Board, with the Gasoline Filler at the Extreme Right, and the Lower is a Top Plan View of the Stripped Chassis.

made for carrying utilities and stores. The compartment beneath the left side of the front seat is sufficient to take all of the tools, spares, supplies, and the like, and the space under the wide rear seat is available for the storage of personal effects. With the running boards clear the car is especially sightly and it can be kept well with a minimum of attention.

fornia, the objective point being San Diego, Calif.

The trip is being made in a Cole car, the gift of J. J. Cole, president of the Cole Motor Car Company of Indianapolis, Ind. G. E. Minor, formerly connected with the Old Trails Association, the National Highways' Association and Indiana Good Roads Association, is at the wheel of the machine. Mr. Minor will lay out, map and log 60,000 miles of the best and most travelled roads in the United States. It is the purpose of the society to so map the ways that a child could understand and be able to fol-

low the information to whatever destination may be desired.

As a part of the instruction in the La Crosse County Agricultural School, La Crosse, Wis., the students are erecting a model fireproof garage and repair shop. The school will also have a gymnasium.

SIXTEEN EVENTS FOR GALVESTON BEACH.

Large Number of Cars Entered Including the Winner at Sioux City---Course Reported Very Fast---Prospects for 1915 Racing---Sioux City Track Sold.

EDDIE RICKENBACHER, winner of the Sioux City sweepstakes, with his Duesenberg car, and Ralph Mulford and Mel Stringer with Peugeots, are the latest entrants to the Galveston Beach races July 29 and 30 and August 1 and 3. This brings the total entry up to 15. It is expected that Barney Oldfield will be entered and will be at the wheel of a 90 horsepower Fiat.

In all 16 events are carded for the four-day meet, including three amateur races. Departing from custom of former seasons, instead of a long distance race competed for in heats, there will be three 50-mile, class D, free-for-all contests, for which the biggest prize of the meet will be offered. There is a total of \$4,650 in cash prizes offered, and many trophies.

Many entrants are either en route for Galveston or have already arrived with their machines. The beach has been tried by several drivers and it is reported to be remarkably hard and fast.

S. F. Duesenberg, Bill Endicott, E. Rickenbacher and one unnamed driver will drive Duesenberg cars. Joe Horan and two unnamed drivers will pilot Metropole. Other entrants and their cars include: Chandler, in a Braender Bull Dog; Joe Le Cain, with a Chevrolet; Charles Keene in a Beaver Bullet, Conde Moseley in a Studebaker, H. L. Kindred in a National, George Clark in a Texas, T. C. Jones in a Mercer, and an unnamed driver for a Delage.

The grandstands, with a seating capacity of over 4,000, are more than half completed. A record crowd is anticipated this year.

PROSPECTS FOR 1914 RACING.

W. A. Smith, advertising manager of the Mercer Automobile Company, Trenton, N. J., says that the revival of automobile competitions, particularly road races, has become general in this country this year. "A review of the contests already held, and a glance at the schedule of the contest board of the American Automobile Association, will quickly show that there is a marked increase in the number of road races, track and kindred contests," said Mr. Smith. "Touring events and the reliability contests such

as predominated on the automobile sports calendar of several years ago, are taking another drop to the discards, the A. A. A. list failing to show one such event scheduled for this season."

Mr. Smith points out that the Grand Prize and Vanderbilt Cup races were run this year after being abandoned last season. Also that the Tacoma, Wash., road races were again held, and the calendar still calls for the running of the Elgin road races, and the Galveston Beach events. He says: "While there is an increase in the interest in road races, the specially constructed speedway events will be the features of automobile racing in the future, with the exception of the Grand Prize and Vanderbilt, which will undoubtedly hold the same position in automobile sports they have in the past."

NEW ENTRIES FOR ELGIN RACES.

Two Mercer cars will be entered in the Elgin road races to be competed over the Illinois course August 21 and 22. Spencer Wishart will return from Europe in time to drive the same Mercer he drove into second place at the recent Sioux City meet at an average of 78.3 miles an hour. Edward Pullen, the driver of the winning Grand Prize Mercer, is now on his way from the Pacific coast to get the second Mercer entry into shape.

Ralph DePalma, with the German Mercedes that won the French Grand Prix, and Bob Burman with a Peugeot, are also entrants. This makes 10 entries to date, exclusive of the Mercer entry which has not been announced officially. There are: two Marmons, two Peugeots, two Sunbeams, two Stutzes, one Mercedes and one Duesenberg.

CADILLAC WINS COLORADO DERBY.

Harry W. Swigert, driving a Cadillac car, won the sweepstakes trophy for the best general average of consistent driving in the first annual all-Colorado motor derby, July 3, 4 and 5. Point cups for the five separate legs of the 280-mile run from Denver to Colorado Springs, Canon City, Pueblo and return, were won re-

spectively by Carl Schaub, Cadillac; Swigert, winner of the grand prize, Cadillac; A. C. Lee, Abbot-Detroit; E. H. Bull, Franklin, and T. Marx, Locomobile.

The winner finished 14:6.15, which was nine minutes under time secretly fixed by the timing committee as the most reasonable for covering the official route.

ADDITIONAL RACE PRIZES.

The Rudge-Whitworth Company, Ltd., Coventry, England, manufacturer of the Rudge-Whitworth detachable wire wheels, announces through its American agency, the Standard Roller Bearing Company, Philadelphia, Penn., that it will give \$200 to the first car in the Elgin races on both days of the meet and \$100 to the second car both days, provided they are equipped with Rudge-Whitworth wire wheels. The Elgin road races will be held this year on August 21 and 22.

NEW DIRT TRACK RECORD.

In the free-for-all at the Rose City track, Portland, Ore., July 12, Percy F. Barnes, in a Romano car, established a world's record for 25 miles on a dirt track, the time being 22 minutes, 7 1-5 seconds. He drove a sensational race against Tetzlaff and Carlson, both driving Maxwells.

Tetzlaff won the first heat of the three-mile event from Brock in two minutes and 37 seconds and won the second heat in two minutes 36 3-5 seconds. In the five-mile race from a standing start Barnes in a Romano won in four minutes and 30 seconds.

OVERLAND FIRST AT VISALIA.

Driving an Oakland car, T. McKelvy, of Fresno, broke the Visalia, Calif., record of 3:4.56 made by Sprague in a National in 1912, and won the 150-mile sanctioned road race in 2:47.53, equal to 53.6 miles per hour. Briscoe in a National pressed him close throughout, and finished in 2:49.46. Campbell in a Packard was third in 3:9.40, and Pillett in a Ford fourth in 3:10.18. The prizes were \$1,000 first, \$500 second, \$250 third and \$100 fourth.

ABANDON WISCONSIN TOUR.

There will be no revival of the Wisconsin State Automobile Association reliability tour for the Milwaukee Sentinel \$1,000 trophy in 1914.

The association claims that the A. A. A. will not grant a sanction for a grade 1 tour, nor permit the association to provide a stock car classification and registry.

SYNDICATE BUYS SIOUX TRACK.

A syndicate headed by E. R. Schultz, secretary of the Sioux City Automobile Club and Speedway Association, which promoted the recent 300-mile race at Sioux City, has purchased the Sioux City track. The new company is capitalized for \$100,000, with \$50,000 paid in.

WANT CREDITORS TO PAY BACK.

Detroit Trust Company, trustees for Herreshoff Motor Company of Detroit, Mich., has asked Lee E. Joslyn, referee in bankruptcy, to demand that the creditors who have received payments within the past four months refund the same. Under the Michigan bankruptcy law no creditor has preference within four months of filing petition, and should any payments be made, as in this case, they must be paid back. The amount involved is not made public.

CROWN COMPANY BUYS PLANT.

The Crown Motor Car Company, Louisville, Ky., has purchased the manufacturing plant owned by the Ohio Falls Motor Car Company at New Albany, Ind. Statement is made that the company will shortly reorganize under the name of the Hercules Motor Car Company, and after additional capital has been secured will operate on a far larger scale than heretofore.

ALTREE JOINS BOSCH.

A. H. D. Altree, former Chicago branch manager of the Bosch Magneto Company, has been appointed vice-president of the concern, with offices in New York. F. D. Norman, previously in charge of the Bosch Toronto office, has succeeded Mr. Altree in Chicago.

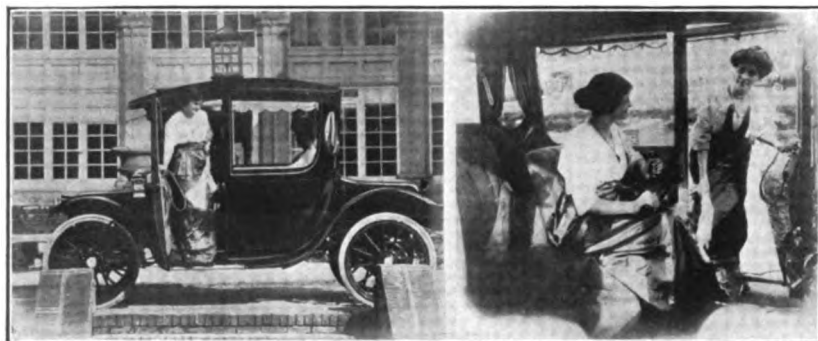
WALPOLE CREDITORS WELL OFF.

R. G. Curtis, representing the reorganization committee of the Walpole Tire & Rubber Company, told Judge Dodge in the United States District Court recently that all creditors would receive 100 per cent. of their claims if the plans of reorganization are adopted.

THE 1915 WAVERLEY MODELS.

The Waverley Company, Indianapolis, Ind., has announced that it will build for the 1915 market what is known as model 109, a four-chair brougham type, and that this vehicle will have incorporated in it a series of devices that will appeal particularly to women drivers, as these are intended to afford every possible factor of safety that science and engineering skill can produce. The control car cannot possibly be started unless the controller handle is at first speed; this prevents the quick start of older types of electric cars, which was caused by the lever being pushed too far forward.

The 1915 Waverley is equipped with five-quarter elliptic springs—the installation being intended to prevent excessive rebound. Should the car so strike a rut or stone as to throw the wheels out for an instant, they are automatically adjusted by the semi-irreversible steering



The Silent Waverley Electric, 1915 Model, the Interior View Showing the Four Chair Arrangement.

system controlled by a side lever.

That the Waverley is specially designed for the women is also shown by the equipment, which consists of gray stripe upholstery, gray axminster carpet, silk drapes for the oval windows and scalloped edge shades on the boudoir type for the large ones, cut glass flower vase, leather toilet case with watch, memorandum book, perfume bottles, umbrella holder, etc., etc.

JULY 4 BIG DAY FOR BOSCH.

That the Bosch Magneto Company has reason to feel happy over the result of the Glorious Fourth is shown by a casual glance at the Bosch victories registered that day. At the Tacoma, Wash., 250-mile race Bosch magnetos and Bosch plugs were on the first four cars to finish. In the 200-mile race at the same place Bosch magnetos were on the first four cars to finish and Bosch

plugs were on the second, third and fourth. In the 100-mile event Bosch magnetos were first and third over the line, a Mea magneto equipped machine being second. The Bosch plugs ran 1-2-3.

At Sioux City, Iowa, Bosch magnetos were used by cars finishing from 1 to 10 without a break and after yielding first place on the plugs to a foreign make, ran from second to 10.

To cap the day's events Bosch magneto equipped cars ran from first to seventh without a break in the Grand Prix of France.

GOOD ROADS AS A CROP BOOSTER.

Statistics issued by the Department of Agriculture, show that an improved road will vastly increase the productiveness of the area through which it is built. These studies were made by the department in Spotsylvania, Virginia. In 1909 the county voted \$100,000 to improve 40 miles of roads. Two years after the completion of this work the railroad took away in twelve months from Fredericksburg, the county seat, 71,000 tons of agricultural and forest products hauled over the highways to that town. Before the improvement of the highways, the total was 49,000 annually. In other words the volume of the country's produce increased 45 per cent.

Likewise there was a great increase in dairy products. In 1909 these amounted to 114,815 pounds but two years later had increased to 273,028 pounds, or about 140 per cent. In addition to this, there was a reduction of eight cents a mile in the haulage cost, which saved the farmers a total of about \$41,000 a year.

On July 31 the Associated Automobile Clubs of New Jersey will have an efficiency run from Newark to Sea Girt.

The post office at Louisville, Ky., has ordered six new motor trucks for the collection of mail. The increase of service will be begun September 1.

More than 15,000 miles and not one breakdown is the record of a Kissel Kar truck, owned by L. G. Goodrich, of Fresno, Cal. This truck has carried seven tons at a time and four or five tons over eight miles of dirt roads.

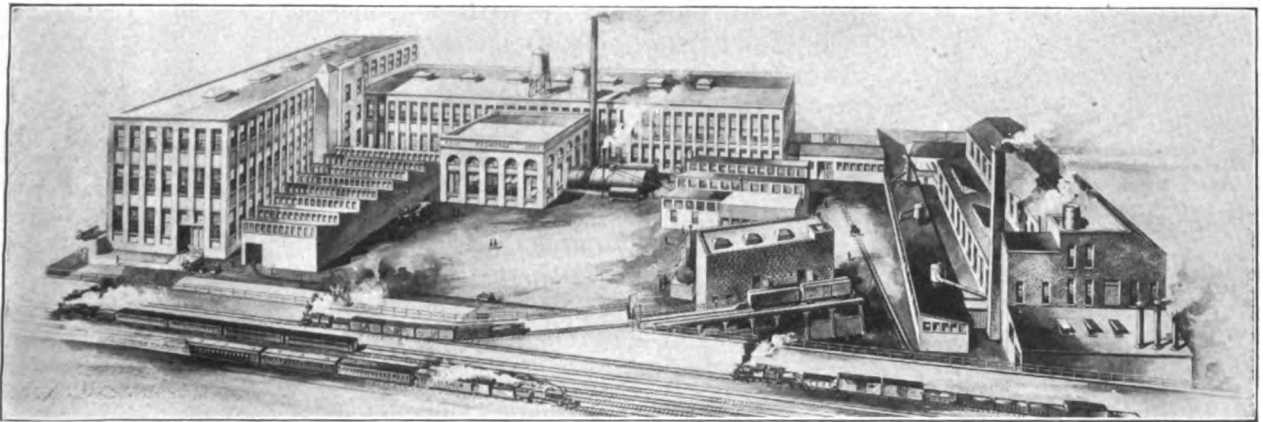
GENERAL NEWS OF THE INDUSTRY.

Bosch Magneto Company Absorbs Rushmore Dynamo Works and Will Market All Its Products---Changes in Personnel, New Concerns and Building Plans.

WHAT is considered the largest merger of the motor vehicle electrical accessory industry was consummated July 11, when the Bosch Magneto Company, New York City, absorbed the Rushmore Dynamo Works, Plainfield, N. J., one of the oldest concerns of the kind in the country. Announcement of the Bosch lighting and starting system was made last autumn, but no extensive advertising and selling campaign was inaugurated. Careful analysis of the market demonstrated very large undeveloped possibilities. The great advantage to both the vehicle builder and the owner having a complete electrical equipment for ignition, lighting and

marketing of all products of the Rushmore Company. The selling organization, method of distribution and supply is exceptionally large, there being beside the four branch houses, a main office and more than 239 distributors and supply stations.

The addition to the Bosch Company production department is more than 100,000 square feet of floor space, with equipment entirely modern and complete. At the Springfield works of the company, all material is received and shipped on a private siding from a main line of a through railroad. The Rushmore Works has its own foundry equipped with power moulding ma-



Rushmore Dynamo Works, Plainfield, N. J., Purchased by the Bosch Magneto Company—The Plant Is Now Known as the Rushmore Works of the Bosch Magneto Company.

engine starting produced by one manufacturer, and all of a quality recognized as standard throughout the world, was such that the company decided to develop its resources for producing lighting and starting systems that would be sufficient to meet any demand made upon it.

With this policy the Rushmore Dynamo Works were taken over in their entirety. The Plainfield plant will be known as the Rushmore Works of the Bosch Magneto Company and operated in conjunction with the Springfield, Mass., factory and will have manufacturing facilities probably second to none for the particular lines to which they are devoted.

The Bosch Magneto Company will continue to manufacture and market its well known ignition apparatus and specialties and the production and

chines; it has its own lens grinding factory in fact, every part of the Rushmore-Bosch products including lamps, searchlights, lighting and starting systems for trains, automobiles, motor boats, etc., can be produced in the new plant. The factory employs more than 700 men, and the Springfield works is even larger.

The Rushmore Dynamo Works has concentrated supplying manufacturers with Rushmore starters and generators, and has exploited them with considerable success abroad, where this equipment is standard for a number of high priced machines. The Rushmore starter has also been exclusively adopted by a number of American car manufacturers.

The first important contract which included the Bosch products was signed by the Nordyke

& Marmon Company, Indianapolis, Ind., for the 1915 Marmon cars, which will be entirely Bosch equipped.

FRENCH SUCCEEDS WILLIS.

George M. Dickson, general manager of the National Motor Vehicle Company, Indianapolis,



Lucius S. French, Advertising Manager, National Motor Vehicle Co.

maker of the well known National cars, announces the appointment of Lucius S. French as advertising manager. Mr. French is well known in the automobile industry, being associated with the Cole Motor Car Company and later with the Henderson Motor Car Company.

He succeeds P. P. Willis, who becomes a member of the Thompson-Carroll-Tripp Company, Cleveland, O., advertising specialists.

DENBY TRUCK COMPANY.

The Denby Motor Truck Company has begun business at Detroit, Mich., with offices at 2036 Dime Bank Building, and a factory at Dubois and Franklin Streets. The factory has 20,000 square feet floor space, and sufficient material has been contracted for to build 500 trucks the first year. The company's officials are: Garvin Denby, president; J. Walter Drake, vice-president; Arthur Webster, secretary; Edwin Denby, treasurer, and R. F. Moore, advertising manager.

ERBES BUYS CUTTING PLANT.

L. S. Erbes has purchased the stock, repair parts, name and good will of the Cutting Automobile Company, Jackson, Mich., and plans to continue motor car manufacturing in the factory building. Mr. Erbes has material for 200 cars, and he proposes to fit Wisconsin motors to Cutting chassis and turn out roadsters and possibly cyclecars.

BUY OLD COLUMBIA FACTORY.

At a price stated to be between \$250,000 and \$350,000, the Billings & Spencer Company of Hartford, Conn., has acquired the factory of the Columbia Motor Car Company, once owned by the United States Motor Company.

OVERLAND HAS LARGEST PLANT.

With completion of extensive buildings now in the course of construction the Willys-Overland Company plant at Toledo, O., will become the largest factory in the world devoted exclusively to the manufacturing of automobiles. More than 1,000,000 feet of working space will be available after the changes are made.

The factory, when completed, will consist of 64 buildings, having an aggregate of more than 60 acres of floor space. These changes were necessary to manufacture the new Overland six-cylinder car, which will be ready for delivery in the early fall, and which will necessitate a further increase in production.

MERKLE JOINS MOTSINGER.

J. F. Merkel, former manufacturer of the Merkel motorcycle, has become identified with the Motsinger Device Manufacturing Company, La Fayette, Ind., in the capacity of general sales manager. This company makes the Motsinger carburettors and electrical apparatus.

Mr. Merkel designed the Merkel motorcycle in 1899 and manufactured this product until about a year ago. He was a pioneer in his field, being the first man to equip a motorcycle with a magneto, and was the first manufacturer to market magneto equipped motorcycles exclusively. Incidentally, Mr. Merkel built the first automobile constructed in Wisconsin.



J. F. Merkel, Sales Manager, Motsinger Device Manufacturing Co.

HOOD JOINS DETROITER.

He Will Relieve C. S. Briggs, President of Company, as Sales Manager.

Wallace C. Hood has been appointed sales Manager of the Briggs-Detroit Company, Detroit, maker of the Detroit.



Wallace C. Hood, Sales Manager of the Briggs-Detroit Company.

Mr. Hood has relieved C. S. Briggs, president of the company of the duties of directing the sales organization, and Mr. Briggs will devote his energies to the production of the 1915 line.

Mr. Hood is well and favorably known to the automobile industry, having been identified with it as early

as 1898. He was travelling sales manager in southern territory for the Thomas B. Jeffery Company, when the single-cylinder Rambler was marketed. In 1905 he joined the forces of the Thomas Company at Buffalo and four years later became identified with the Chalmers Motor Company, having charge of the western territory. Later he was appointed sales manager for that company. In 1911 he was engaged with the Metzger Motor Car Company, remaining with that concern until it was purchased by other interests.

Mr. Hood is extremely well known to dealers throughout the country. He estimates that he has travelled about 150,000 miles in his capacity as sales manager. He is a specialist in field work.

TO CLOSE POPE PLANT.

August 20 is the Date Named for Shut-Down-Property to Be Sold.

The plant of the Pope Manufacturing Company, Hartford, Conn., will close permanently August 20, according to the information given by Receiver George Pope to Judge Holcomb in the

Superior Court. At the same time the court granted the receiver authority he asked for to sell the property of the Pope Manufacturing Company, in Connecticut, as a manufacturing unit. The court also permitted the sale of the company's personal property, at the discretion of the receiver, except the cash and bills receivable.

This action follows the decision rendered by Judge Bennett during the early part of July declining to permit the receiver to sell the Pope properties in Connecticut and Massachusetts at auction as a whole, advising the receiver to apply for an order to sell it separately.

Receiver Pope told the court that in his opinion more money could be secured if the property was sold in small lots to purchasers who desired certain parts of it. The counsel for the receiver announced that a dividend would be paid before September 20.

HOOVER HOLTON JOINS MONARCH.

Hoover Holton, formerly associated with the American Motors Company and the Empire Automobile Company of Indianapolis, Ind., has taken full charge of the sales of the Monarch Motor Car Company of Detroit, Mich., as general sales manager.

Mr. Holton has had wide experience and a host of friends in the trade. He has travelled the entire United States and Canada, and has placed automobiles in many parts of the world. It is said for Mr. Holton that he has a keen conception of the dealer's position and co-operates with the dealer and distributor to placing their business on a scientific basis that will afford maximum results.



Hoover Holton, Sales Manager, Monarch Motor Car Co.

Mr. Holton is a specialist in field work and his connection with the Monarch Company will mean greater activity for the selling organization.

RECEIVER FOR U. S. L. COMPANY.**Company Claimed to Be Solvent But Poor Management is Alleged.**

Judge Hazel, of the Federal District Court, Buffalo, N. Y., has named two receivers for the United States Light & Heating Company, who are to continue the business of the concern.

James O. Moore, of Buffalo, and James A. Roberts, of New York City, were named by the court, a joint bond of \$100,000 being fixed for the two. Mr. Ackerman is vice-president and general manager of the company, and Mr. Walker is a member of the stockholders' investigating committee.

Several petitioners in the United States Court added to their application for the appointment of a receiver, allegations of mismanagement. The petitioners allege that in the past five years, directors of the United States Light & Heating Co., a Maine corporation, with a plant in Buffalo, N. Y., issued in an illegal manner \$9,500,000 worth of stock. Five particular cases were cited by the petitioning stockholders where stock was issued in violation of law.

According to one allegation the committee, through its investigations, found that the company was suffering from lack of working capital, a condition brought about by poor financing. Consequently, the stockholders decided it would be to the best interest of the company if certain officials, who are also directors, resigned from both positions.

Since the first of the present year the affairs of the company have been handled by Frederick R. Humpage, of Buffalo, Guy M. Walker and J. A. Fletcher, both of New York, as a stockholders' committee. The petitioning creditors state they do not desire that the factories of the company be closed. They offered in evidence contracts to show that considerable business is obtainable by the company and that money sufficient to meet all obligations reported existing, can be secured within the next several months. The concern claims assets of \$3,000,000, with reported liabilities of \$900,000.

PARTIN-PALMER IN STAVER PLANT.

The Partin Manufacturing Company of Chicago, maker of the Partin-Palmer car, has secured the old Staver plant in that city, and took possession July 1. The Chicago property has

three times the capacity of the company's Detroit factory. Increase of business with the production of a low-priced car made the change necessary.

NEW EISEMANN BRANCH.

Owing to a large increase in business the Eisemann Magneto Company, Brooklyn, N. Y., has changed the location of the Indianapolis branch from 514 to 415-417 North Capitol avenue. The change affords better facilities for the the offices and the service department of the company. Prompt and efficient service is assured Indiana users of the Eisemann products. The company announces that orders received for the Eisemann magneto attachment for the Ford car can now be filled on the same day the order is received.

WILL INCREASE CAPITAL.

According to reports in financial circles the General Rubber Company, which is owned jointly by the United States Rubber Company and the Rubber Goods Manufacturing Company, will increase its stock from \$5,000,000 to \$8,000,000. The stock of course, will be subscribed by the two companies.

NEW FEDERAL FACTORIES.

An order for new factory buildings costing \$500,000 was the way in which officials of the Federal Rubber Company, Milwaukee, Wis., celebrated the third anniversary of that organization. Work is already under way for the new structures, and when completed they will add about 150,000 square feet of floor space to the works.

WITH FEDERAL TRUCK COMPANY.

Harold P. Sigwalt, formerly in the advertising department of the Geuder, Paeschke & Frey Company, Milwaukee, Wis., is now connected in a similar capacity with the Federal Motor Truck Company of Detroit.

NEW OAKLAND BRANCH MANAGER.

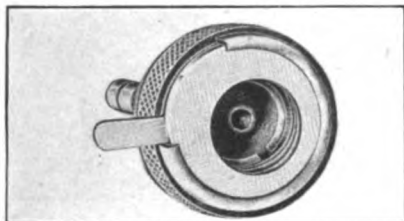
L. S. Shouk, formerly sales manager of the John Deere Plow Company, has been appointed branch manager of the Oakland Motor Company at Indianapolis, Ind.

NEW ACCESSORIES FOR THE MOTORIST.

BELL HOSE CLAMP.

Locks to Valve Member and Prevents Leakage When Pumping.

The Bell Pump Company, 78 First street, East Detroit, is marketing the Bell hose clamp, a connection for tire



pumps, which the maker states is very efficient. It not only has a rubber socket, but in addition a threaded internal eccentric, which operates internally upon the threaded part of the tire valve tube.

The rubber socket is engaged with the valve member in the usual manner, and a pressure of the finger actuates the eccentric lever and threaded eccentric inside the clamp, engaging the threads of the valve much in the same manner as a nut. This construction, shown in the accompanying illustration, prevents the clamp working loose. The device is quickly detached by moving the lever member and displacing it from the valve.

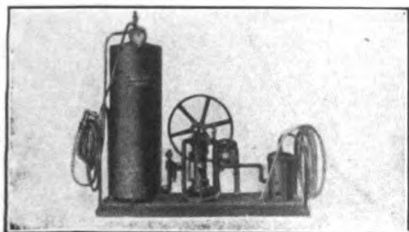
DUNKLEY COMPRESSOR.

Combines Power Pump, Motor Cleaner and Vacuum Cleaner.

The Dunkley Company, Kalamazoo, Mich., is manufacturing an equipment for the private as well as public garage, which combines the functions of a high grade air compressor, a vacuum cleaner and a motor cleaner, all mounted on one base.

The compressor is designed to be driven either by a belt or by an electric motor, provision being made for the installation of the last named unit. The compressor proper is of the double acting, water-cooled type and is a high pressure design. The tank has a capacity of 80 gallons and is provided with a gauge, suitable length of high grade flexible hose and connections.

Mounted on the same base is the motor cleaning attachment. It comprises a fuel tank and a two-way nozzle, which has passages for the air and gasoline, which breaks the liquid up into a very fine spray. Being projected under considerable



pressure, the atomized fuel will reach and clean places not easily accessible by the usual methods. It is stated that heavy deposits of grease and oil may be displaced readily and that the surface is left very clean.

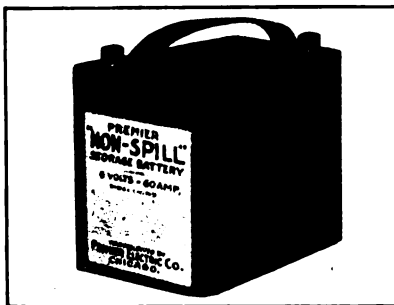
The vacuum cleaner is obtained by utilizing the intake of the compressor, a vacuum tank and dust collector being provided. This permits of utilizing the equipment for removing dust from tufted cushions, tops and places difficult of access with ordinary cleaning members.

NO-SPILL BATTERY.

Electrolyte Is Stated to Be Non-Freezing and Non-Spilling.

The Premier Electric Company, 4031 Ravenswood avenue, Chicago, maker of the Hi-Lo horn for the Ford car, is introducing a storage battery which may be utilized for ignition, lighting, operating a horn, etc.

The electrolyte is stated to be non-freezing, as well as non-spilling, special emphasis being laid upon this feature, which makes for convenience when handling the cell and cleanliness of the battery compartment. The



efficiency of the battery is stated to be equal to conventional types.

The case containing the cells is finished with rubberoid paint and is supplied with antimony binding posts, which are held to be non-corroding. The Non-Spill storage battery comes in six-volt, 60 ampere-hour and 80 ampere-hour capacities and is moderately priced.

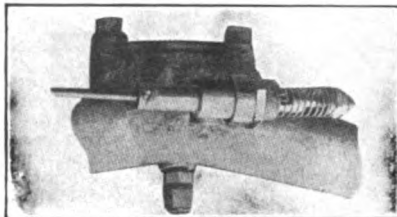
DIMMERS.

The number of cities enacting ordinances regulating the use of headlights on motor vehicles is increasing. While the car manufacturers are giving this much attention many thousands of machines are lighted by electricity and acetylene that are not equipped with light regulators. To equip a machine with a device for eliminating the glare of the lamps does not entail any material expense for the owner, for generally these are moderately priced; in fact, there is a large variety offered at a reasonable cost. Light controllers are a distinct advantage when meeting with and passing other vehicles and pedestrians, making for fullest safety for all users of the highways.

HANDY CONTROLLER.

Automatically Admits Air to Intake Manifold as Required.

The Handy carburetion controller is the product of the Cray Company, 652 Woodward avenue, Detroit. It is



a simple, compact device, which is fitted to the intake manifold between the carburetor and the cylinders. The function of the controller is to automatically provide extra air to the mixture, thereby reducing the suction at the spraying jet and preventing undue enriching of the mixture at all motor speeds. The stream of air striking the fuel vapor breaks it up into a fine spray and mingles it with the air, thereby obtaining a rapid burning charge.

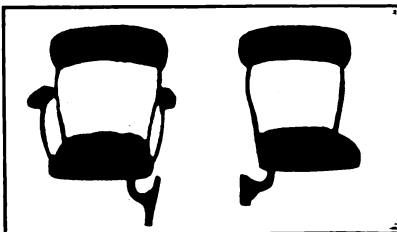
The Handy controller is automatic in its action. After the motor has become warmed up a small control lever on the steering column or other convenient place is moved, which opens the Handy valve. A special equipment is made for the model T Ford motor.

HILL AUXILIARY SEATS.

Lock Automatically, Fold in Small Space and Are Detachable.

The Hill Manufacturing Company, 27 Fuller street, Buffalo, N. Y., specialist in seats for motor cars, is marketing the revolving auxiliary seats shown in the accompanying illustration. These designs have folding cushions and the seats are square, with slightly rounded corners. The width is 13 inches; depth, 11.5; height from bottom of seat to top of back, 17.5; back, 16 by five. The spring cushions are trimmed plain or tufted and with dark leathers.

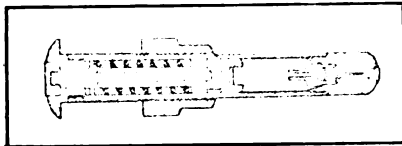
The seats lock automatically in two positions without the use of springs or levers, fold up in a small space and are instantly detachable without the aid of tools. The riding qualities are said to be all that could be desired and the best of material is utilized throughout.



GEM SAFETY TIRE SIGNAL.

Explodes Percussion Cap When Pressure Falls Below Normal.

The Safety Tire Signal Company, 655 Twelfth street, Boulder, Col., is marketing the Gem Safety tire signal.



nal, a device which warns the operator of the car when the pressure in the tire falls 20 pounds below normal. It is approximately the same size as the conventional tube valve and it is stated that it may be installed easily. It is also water and dust proof.

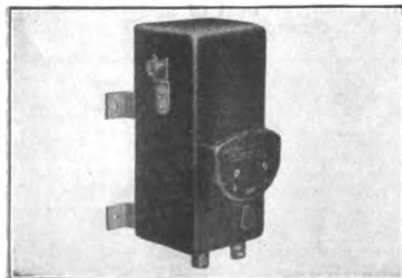
When the pressure in the casing falls from 80 to 60 pounds, for example, the device fires a percussion cap in the head of the construction, and it is stated that the signal is sufficiently loud to attract the attention of the driver. It does not allow the air to escape, however, as there is no connection between the signal and the tube, except that the inner tube lies over the end of the device, keeping it locked until the pressure falls. The Gem Safety Tire Signal comes in sets of four for solid rims and with one extra member for the demountable types.

BROWN MASTER VIBRATOR.

New Design for Model T Ford Motor Held to Be Very Efficient.

The Brown Company, Syracuse, N. Y., is manufacturing a new type of master vibrator for the model T Ford motor, and one of its qualities is the purely mechanical adjustment employed. It is stated that it is so simple that a novice may adjust it without trouble and in a very short time. It is also stated that when once set it will require no attention, as the adjustment is permanent.

Another feature is the use of non-sticking contact points. This is obtained by the method of separation, a sharp blow action being utilized instead of their being drawn apart. They are constructed of a specially hardened material. The vibrator is mounted in a mahogany dash case equipped with a substantial kick switch, and can be attached to the dash between the regular coil and the source of current supply. A Puritan switch is utilized, the design being thief proof, as the lever or han-



dle may be displaced. The advantages of a master vibrator are well known. The new design is constructed of high grade material and the workmanship is first class in every respect.

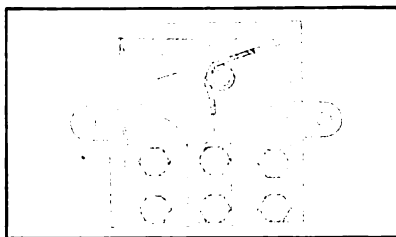
MAPLE THERMO CUT-OUT.

Replaces Fuses in Lighting System and Breaks Circuit.

The R. H. Maple Company, Indianapolis, Ind., has brought out the Maple Thermo cut-out, which is a device for replacing fuses in the electric lighting system of the motor car. It employs the thermostat principle, being affected by the heat of the current passing through it, and it is adjusted to break the circuit at a temperature of 200 degrees.

The thermostat metal is in the form of a coil, as shown to the right in the illustration, and the connections are two nuts at the lower corners. The electricity passes through the thermostat metal and wire connection to the central metal fitting, thence to a similar member at the left through contact points at the upper corner.

Any excess current causes the thermostat to coil more closely, allowing the lever across the top of the cut-



out to be lowered under the influence of the spring contact points, interrupting the current. With a two-wire system two cut-outs are combined. A post projects through the cover near the middle of the lever, serving as a visual indicator when the current is interrupted by the cut-out, by assuming a position opposite the word "Off". It is stated that the device offers only a fraction of the resistance of fuses. It is placed on the dash and wired between the battery and the switch.

TIRE SIGNALS.

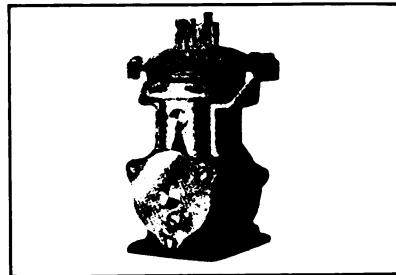
Despite the fact that the tire manufacturer warns the motorist that efficiency can be obtained only when the shoes are inflated and maintained at predetermined pressures, many automobilists are content with observing the instructions only when fitting a new casing. If the pressure falls the fabric is subjected to undesirable stresses.

Several devices are marketed for notifying the driver when this pressure falls, and one that sounds a signal sufficiently loud to be heard when the car is being operated. Another device explodes a cap. Both types serve a useful purpose in that the motion of the car may be checked before the tire is damaged.

TAYLOR POWER PUMP.

New Design Has Many Improvements and Is Lighter.

The Taylor Manufacturing Company, box 485, Chicago, maker of the Taylor engine driven tire pump, has



made a considerable change in the original design, which has been described in these columns. The air valves in the head are now machined out of bar stock and replace the rough casting formerly utilized.

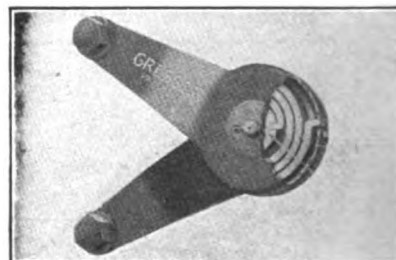
It is pointed out that this tends to keep the pump much cooler. The body has been stripped of all unnecessary corners, ribs, etc., and now presents a very smooth, attractive appearance. The weight has also been reduced by the removal of all surplus material. A larger oil filler has been incorporated for replenishing the supply to its crankcase.

GRESSER SHOCK ABSORBER.

Coil Springs Utilized and Device Acts in Both Directions.

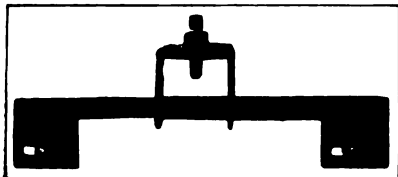
The Buckeye Suspension Company, Cleveland, O., is manufacturing the Gresser shock absorber, which resembles those employing the friction principle, but the shock absorbing action is obtained by two coil springs. One of these is secured to one arm of the device and the second to the other member in such manner that the absorber acts in both directions. The special feature claimed for the device is that a limited amount of spring movement is permitted without the absorber being actuated, but with large oscillations of the springs the movements are controlled.

This is explained by the fact that with seven or eight-inch leverage the outer coils of these springs will offer practically no resistance when wound at an angle of 12.5 degrees. With this leverage approximately 1.5 inches play above and below the normal position is allowed, or three inches in all.



KISKI LICENSE PLATE HOLDER.**Practical Device for Securing License Plate to the Vehicle Springs.**

The Kiski Novelty Company, Leechburg, Penn., is manufacturing a patent license plate holder which,



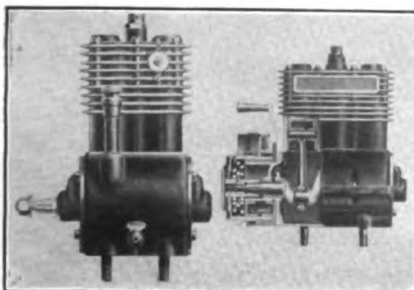
the company claims, holds the number plate securely and does not mar or detract from the beauty of the car.

Recently the improvements were made on the holder, and the new type is attached by a clip placed over the top of the lower leaves of the front springs, being secured by a set screw and lock nut. The license plate is retained by two small bolts and wing nuts attached to the arms of the holder. As shown in the accompanying illustration these arms are adjustable to any width license plate. It is claimed for the new device that it is at all times secure, does not rattle or obstruct the passage of air to the radiator.

THE AERO PUMP.**Several Types Marketed by Advance Machinery Company.**

The Advance Machinery Company, Toledo, O., is producing the Aero pump, in one, two and three cylinder models, which are motor driven. These are designed for regular and special equipment of new cars, and for installation in motor cars already in service. One feature of Aero pumps is the automatic blow-off valve. This can be set for any pressure desired and automatically exhausts when it is reached. In the illustration the two-cylinder pump without gear shift is shown at the left, and the three cylinder pump with eccentric gear shift is at the right. The cylinder and crankcase parts are gray iron castings, sand-blasted, double-coated with baked black enamel. The trimmings are nickel finished. The crankshaft and connecting rods are drop forged. The bore of the cylinder is 1 3/8 inches and the stroke is 1 1/4 inches.

The intake valves of Aero pumps are carefully screened to keep out foreign matter. A splash system

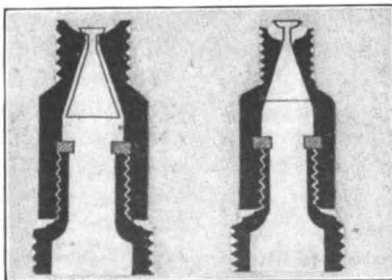


lubricates the cylinders and bearings of the crankshaft, and the maker claims it practically impossible for oil to work up on the cylinder head. But to insure that no oil goes into the tires, two different forms of oil separators have been provided between the outlet valve and the tire connection.

DAY TIRE VALVE.**Atlas Auto Supply Company Adds Springless Valve to Its Product.**

The Atlas Auto Supply Company, Chicago, Ill., manufacturer of Tire-Doh and Tire-Doh products, is marketing a new tire accessory known as the Day tire valve. This valve consists of three parts only, and no springs are used.

The Day valve is made of brass. It is screwed into the tube valve stem after the old valve has been removed. It is stated that the absence of springs gives longer life to the valve. Another quality is that tires can be pumped with greatly reduced effort, and fewer number of strokes, because there is no back pressure caused by spring resistance. This, of course, is due to the fact that the valve has no springs, and to the



greater size of the passage for air. In the accompanying diagram the figure at the left shows the valve open, and in the other it is in a closed position. Day valves are supplied in sets of five, this number equipping the four tires in use and a spare tube.

TIRE VALVES.

Among the accessories placed on the market are tire valves designed to economize time and labor of the motorist. A great deal of effort is necessary when pumping to overcome the pressure of the ordinary tire valve, and a part of the stroke of the manually operated pump is necessary to compress the air to the pressure that will open the valve. The new tire valves are so constructed that the pressure required to open them is comparatively small, and one of their qualities is that they open at the beginning of the pump stroke. Generally these valves can be used in or on the valve stems of the tubes. They are not expensive, are easily attached and their usefulness will appeal to motorists whose machines are not equipped with power tire pumps.

Always consult the Classified Buyer's Guide published elsewhere in this issue when in need of material, etc.

MOTOR DRIVEN AUTO HORN.**New Construction of Ball and Rotor Said to Eliminate Friction.**

The Duplex Electric Manufacturing Company, Pittsburg, Penn., is marketing the Safeguard motor driven



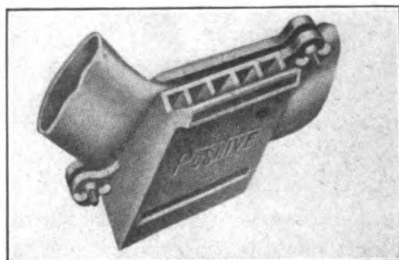
auto horn, which, is maintained, causes extremely light wear on the motor bearing. The Safeguard horn is a ball and rotor construction, and it is claimed that it is economical of current and that friction is entirely eliminated.

The horn is made in two models, A and B, both identical, save that the latter is three inches longer and sounds a deeper and more powerful tone. A smaller horn to be driven by three dry cells is made for use on motorcycles. The makers state the Safeguard horn was tested for nearly two years before it was placed on the market, and they have types that are efficient and durable.

NEW STEAM VULCANIZER.**Positive Supply Company Now Manufacturing Small Portable Vulcanizers.**

The Positive Supply Company, Davenport, Iowa, manufacturer of portable steam vulcanizers and kerosene garage heaters, is producing a steam tire tube vulcanizer for use in private garages and small repair shops. It is stated that this equipment is the only one made expressly for repairing tire tubes that utilizes steam for vulcanizing.

The maker states that the outfit can be carried in the tool box of an automobile. It consists of a metal body, with one compartment for water and another for fuel. The water section is between the tube and the flame, where it equalizes the heat generated. A tube is vulcanized, says the manufacturer, so that the patch becomes a part of the tube, without danger of burning or scorching. It can be mounted on any bench or post. The weight is three pounds. A surface of 12 square inches can be vulcanized with one setting.

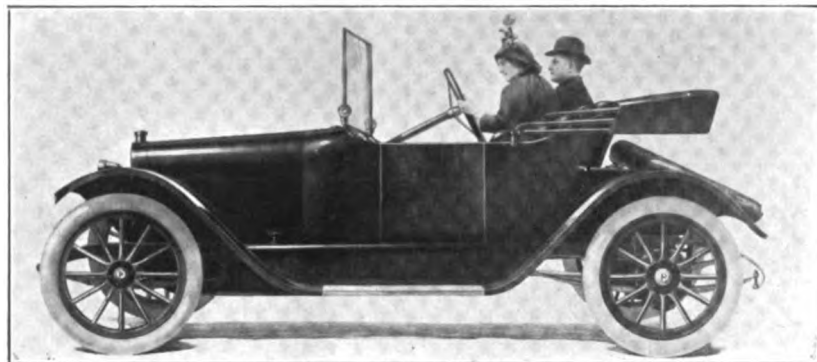


PARTIN-PALMER ANNOUNCES NEW MODEL.

ALATE construction in light cars is a run-about, the Partin Palmer "20," made by the Partin Manufacturing Company, 29 South

tion and lighting. A Gray & Davis electric starter is furnished as extra equipment.

The Atwater Kent ignition system is driven by spiral gears. The motor drive is taken by a cone clutch and thence transmitted by shaft to the rear axle, with which is incorporated the gearset. The gearset affords three forward speeds with a motor to wheel ratio of 4 to 1 on high. The gears are made of chrome nickle steel, and the shafts are mounted on Hyatt high duty roller bearings. Adjustments are provided for the bevel gears and for the gear shifting rods. The rear axle is a built-up structure with full floating



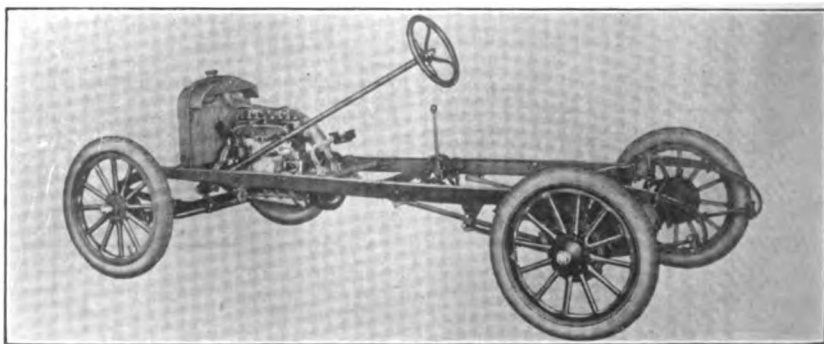
The Partin-Palmer "20," Showing the Streamline Body and the Complete Equipment.

La Salle street, Chicago, Ill. The features of this car include a streamline body, full equipment, including the Gray & Davis electric lighting system; standard tread and 96-inch wheelbase, Atwater Kent ignition, irreversible steering gear, rear axle gearset, full floating rear axle, three-quarter elliptic rear springs, and sliding gear transmission.

An L-head, block cast, four cylinder motor with bore of 2 3/4 inches and stroke of four inches, with a single casting combining the intake and exhaust manifolds, is mounted on a three-point suspension. According to the manufacturer's claim the motor will develop 22 horsepower, and the car can be driven from 30 to 35 miles to one gallon of gasoline. The gear ratio provides a maximum speed of 50 miles an hour on a level road. The machine has a honeycomb radiator, provided with a water tank at the top, because of the thermo-syphon water circulation. The valves are on the left hand side, and their stems are fully enclosed. Lubrication is by splash in connection with a mechanical plunger pump. The crank case is a single aluminum casting. The Gray & Davis electric generator is mounted on the left side of the motor and driven by a gear in the timing gear housing. A storage battery is used in connection with this generator, which provides current for igni-

shafts. The differential is carried on Hyatt high duty bearings, and the rear wheel hubs are mounted on single annular ball bearings. The drive shafts are made of nickle steel, heat treated, and the differential can be removed through an opening in the housing without removing the axle or the wheels. Both sets of brakes are located on drums at the rear wheels, and are operated by pedals. The torque reaction is carried by a short spring supported torque arm attached to the left side of the transmission housing and separate radius rods with ball and socket joints at the ends relieve the springs of the driving thrust.

While the frame is quite wide at the rear and narrow at the front, a tapered bonnet being used, it has no abrupt offset. The sides are parallel over the semi-elliptic front springs, and begin to diverge just in back of them, becoming parallel again at the forward end of the rear



Side View of the Partin-Palmer "20" Stripped Chassis.

springs, which are three-quarter elliptics. The lower spring is underslung, and integral grease cups are provided at the shackle bolts.

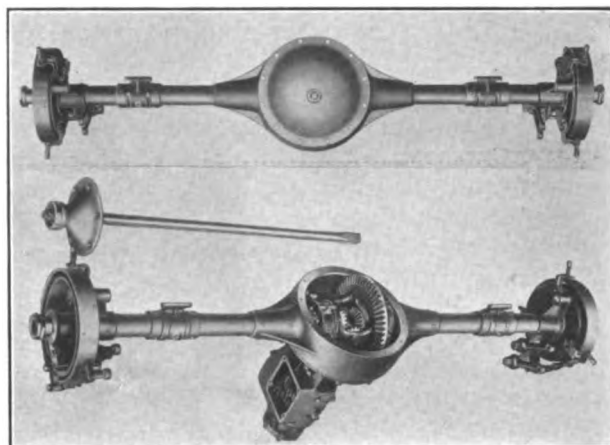
Despite the relatively short wheel base, 96 inches, the driver's compartment is sufficiently large to insure comfort. The dash carries indicators included in the equipment and the cowl contains the gasoline. The full size wooden wheels are equipped with Goodrich non-skid tires of 28 by 3 inches. A spare shoe is carried in the rear, as shown in the accompanying illustration, over the luggage compartment.

WOMAN MAKES AUTO CLEANER.

She Engages in Production of a Body Polish of Her Invention.

Merely driving a car does not satisfy the ambition of women, if one judges from the fact that the sex has now turned to the possibilities of business dependent largely upon the use of automobiles. The fact that a woman was advertising manager of a large prominent automobile concern, was an interesting example, but it is a fancy from such work to the work taken up by Mrs. C. C. Janes, who is manager of the Varni-Shine Company, Columbus, O.

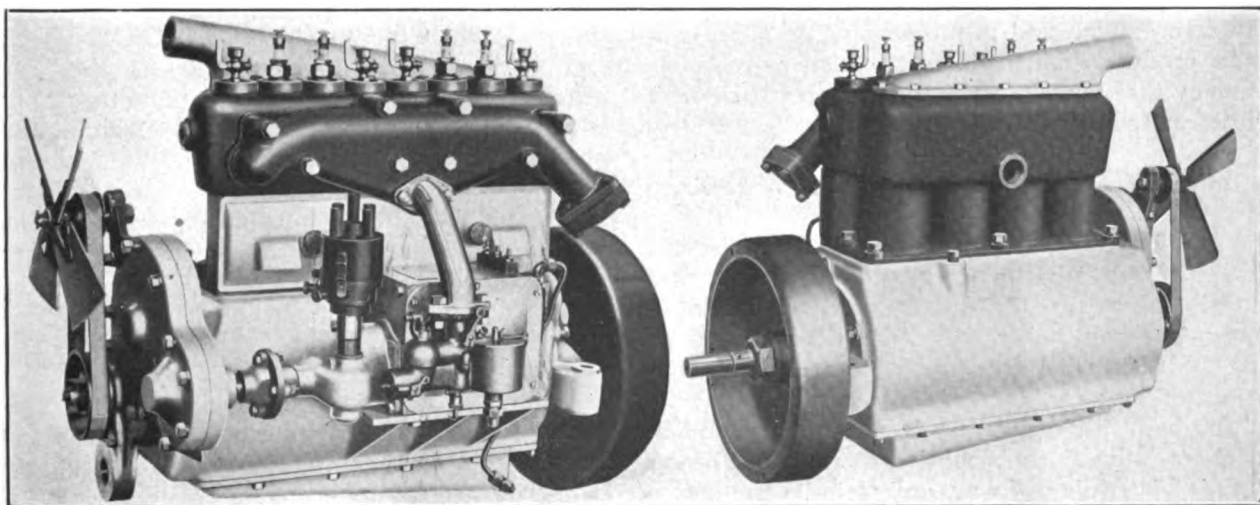
Mrs. Janes is manufacturing a polish of her own invention which she says will keep an automobile body in as fine a condition as when it was first turned out by the factory. Mrs. Janes operates her own plant and superintends the sales organization. She began manufacturing last November, and, with her administration, the business has so increased that a modern factory



Partin-Palmer Rear Axle, Assembled, and with the Differential Plate Removed and a Driving Shaft Withdrawn.

building is about to be erected to meet the demand of rapidly multiplying orders.

Knowing something of the automobile industry, and having had actual experience in the owning and driving of cars, Mrs. Janes realized that the owner of a motor car desires to maintain the appearance of the finish so far as possible. Because of use and frequent washings, this result is not always practical. To obviate dulling the varnish by soap and water the finish must be cleaned with oils in order to retain the elasticity of the varnish. Knowing these conditions, Mrs. Janes was convinced that motorists would appreciate and use such a material as would clean, polish and preserve at one application, thus saving time, labor, exposure and money, and engaged in business that has proven very successful.



The Partin-Palmer Motor: At Left, the Valve Side, Showing the Combination Intake and Exhaust Manifold; at Right the Clear Side of the Engine.

MILLIONS EXPENDED FOR GOOD ROADS.

AN expenditure of approximately \$206,000,000 was made last year for road building and maintenance in the United States. In nine years the expenditure for road development has increased 250 per cent. The total expenditure in 1904 being \$79,000,000.

In 1913 the individual states appropriated a total of \$38,755,088 to supplement local expenditures. The bulk of the money supplied last year, as in all former years, came from counties and townships. In 1912 the money raised from this source totaled \$137,493,985. Complete figures for 1913 are not yet available, but the Department of Agriculture places the amount at \$151,000,000. To this must be added \$15,000,000 to represent the value of the labor contributed instead of cash.

There are at the present time 20,741 miles of roads improved either wholly or in part by state aid. Of 2,226,842 miles of roads in the United States, 223,774 miles, or 10 per cent. are classed as improved. To improve the remaining 90 per cent. is a mammoth undertaking, but records show that all good roads work really pays for itself. The first evidence of returns on bettered highways is the reduction in the actual cost of hauling. With a market accessible to them, farmers will work land to its maximum production, which in turn gives an increase in farm property values.

This rise in value, says the Department of Agriculture is not a fictitious one, for it does not benefit the man who wishes to sell and not to farm. The land is more valuable because it can profitably be made to produce more. The money that goes into the roads comes back with interest from the land.

CALIFORNIA GOOD ROADS WORK.

The highway Commission of California has gone to great lengths to secure good roads in that state. More than 2,700 miles of trunk-line highways are now being built with a bond issue of \$18,000,000. The thoroughfares are being constructed for an average of \$6,000 a mile.

To build highways at this figure, the commissioners induced the counties to donate all land needed for rights of way, and to build the necessary bridges. Likewise they persuaded the cities and incorporated towns along the routes to

agree to pave and maintain the sections within their corporate limits at their own expense. A reduction of nearly 50 per cent. in freight rates on materials was secured by the commission, as the companies were assured that great quantities would be transported.

To insure the safety of travellers, grade crossings are eliminated as much as possible and long, sweeping curves are substituted for abrupt turns and the roadways widened. Nearly all grades are within six per cent. maximum.

GOOD ROADS FOR INDIANA.

Governor Ralston of Indiana has appointed a commission and a board of advisors to study the good roads problem of that state with a view to getting quick action in the near future. After a thorough investigation, the commission will make recommendation of a draft of a law to the Legislature next January. At the present time the roads of this state are not uniformly built or maintained.

CONDITION OF VERMONT ROADS.

Roads are seldom closed in Vermont. In that state the town is the unit, and the highway construction carried on does not interfere with travel to any material extent. The state highway commissioner reports that rarely is a road closed, especially during the summer months.

SIGNS TO WARN MOTORISTS.

As a result of the many accidents on the Long Island Railroad grade crossings, the Automobile Club of America has offered to place warning signs 100 yards on either side of the tracks. While this would be helpful during the daytime, yet it would be useless at night when the danger is greatest.

NEW RAQUETTE LAKE ROAD.

A new highway is being constructed at Raquette Lake, N. Y., to connect with the famous Uncas road leading to Eagle Bay. Raquette Lake has heretofore been inaccessible to automobiles. It is now planned to extend the road along the western shore of the lake to the Forked

Lake Carry, where connection can be made with Long Lake and Newcomb, and the network of state roads in the eastern section of the Adirondacks.

PORTLAND-BRUNSWICK DETOUR.

One of the most noteworthy works of road building now progressing in New England is the building of a 20 mile stretch of bituminous-macadam way between Portland and Brunswick, Me. Construction is now in progress for almost the entire distance, and there is a hope that the work will be extended to Bath next year.

For the benefit of the motorists contemplating a trip between these two points, the Maine Automobile Association has mapped out a detour covering 38 1-2 miles. This starting from Portland, is by way of Woodfords, West Falmouth, Yarmouth, South Freeport and Freeport into Brunswick.

Rhode Island Roads.

All state highways in Rhode Island will be open for travel through the whole of the season, according to the State Board of Public Roads.

Book for Maine Motorists.

The Maine Automobile Association has issued a road book containing a road map of the entire state, and a sportsman's map for fishermen and hunters who may make use of automobiles during their expeditions.

Highways in Brooklyn, N. Y.

Superintendent of Highways Leavitt of Borough of Queens, New York, says immediate work will be begun on resurfacing Merrick road to the city line with bituminous asphalt. All roads in Queens are reported in perfect condition.

Maine Roads Fine for Tourists.

The Maine Automobile Association reports that while there are hundreds of miles of new roads being built throughout the state, there is no interference to automobile traffic. Splendid detours are being furnished by the association.

Women to Urge Good Roads.

Mrs. Robert Baker, chairman of the recently created Woman's Auxiliary department of the American Highway Association, announces she has completed preliminary plans for organizing the women of the United States for the improvement of the roads of the nation.

Canada's 3000 Mile Highway.

United States Consul-General Mansfield at Vancouver, B. C., reports that the 3000 mile ocean-to-ocean motor highway across Canada is

virtually completed. "Automobiles are running almost the entire length," says the consul, "and only a few more links of the chain are needed to complete it."

Big State Road Fund.

By a decision handed down by the County Court of Dauphin, Penn., \$1,028,665 is made available for good roads work. The Auditor-General and State Treasurer brought action to obtain a judicial interpretation of the law passed in 1913 which required the turning over to the Highway Department of all moneys accruing to the state from the licensing of automobiles and drivers.

New York Road Repairs.

The highway commission of New York state reports that there are now approximately 600 contracts for construction or repair now effective in all sections of the state, the work varying from one-quarter to 12 miles in length. The main routes between New York and Rouse's Point, and between the Massachusetts line and Buffalo, are practically completed and no difficulty traversing them will be experienced by the motorist. Suitable detours are provided where road repairs are making.

New Jersey Speed Traps.

A warning has been sent out by the Automobile Club of Maryland regarding the existence of new speed traps in New Jersey. Two state automobile inspectors, disguised in linen dusters, ride in an automobile and come up behind the motorist driving within the 25-mile limit. They will then attempt to induce him to increase his speed by faking an effort to race. Should the unsuspecting driver accept the invitation, he is placed under arrest immediately after he exceeds the speed limit.

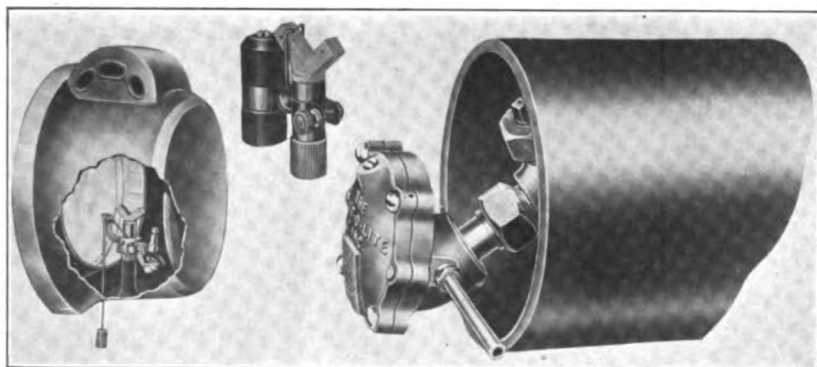
Road Detours in Connecticut.

According to advices received by the American Automobile Association from the State Highway Commissioner of Connecticut, motorists must make many detours in traversing that state. The road from New York to Westerly running along Long Island shore is blocked at the following points: Town of Orange, short detour; East Haven, one-half mile detour; Groton, on Fort Hill, detour to the right through Noank; Stonington, east of town, requires detour to the north. These places will be cleared very shortly with the exception of Orange. There may be further construction, however, in Stonington and Groton to complete the entire road through this section of the state.

NEW PREST-O-LITE VALVE.

The Prest-O-Lite Company, Inc., Indianapolis, Ind., is now producing an automatic reducing valve for use with its motorcycle Prest-O-Lite gas tank. The construction is similar to that of the larger tanks in that there is automatic control of the gas pressure, which is maintained at two ounces even when nearly empty. The flame may be increased or diminished as desired.

The maker states that the control makes for convenience, especially when the gas is ignited by an electric spark, as the rider can light the headlamp without dismounting. The company is marketing an insulating attachment for burners so that the rider may utilize the current from the magneto or a spark plug for igniting the gas. A friction lighter, shown in the accompanying illustration, which may also be fitted to a lamp,



Prest-O-Lite Automatic Reducing Valve for Motorcycle Gas Tanks, Main- taining Correct Pressure, and Friction Lighter.

is being marketed. By pulling a pendant a spark is created at the lamp burner outlet.

ROAD WIDENING ILLEGAL.

City Solicitor Baker, of Providence, R. I., has ruled that the two resolutions passed by the City Council, for the widening of Thayer street, from Waterman to Angell streets, are illegal. This is due to the fact that the City Council added on each resolution that improvement was to be made "if deemed advisable" by the board of aldermen.

WIZARD AUTOMOBILE WASHER.

A device which insures effective cleaning of the surface of the automobile and saves time in the work without requiring hardly any attention from the operator, is in the Wizard washer, made by the Century Foundry Company, Inc., 1624 North Salina street, Syracuse, N. Y. Wizard

washers are simple, but are ruggedly constructed and consist of a nozzle which contains a turbine motor, one conical and one straight-sided brush and a 12-inch extension for reaching beneath the car. The rotating brush which is driven by and flooded with water, serves to thoroughly cleanse the car, without marring the finish. Each outfit is guaranteed to give absolute satisfaction.

WANT ROADS FOR CONNECTICUT.

The Connecticut Good Roads Association has begun an active and energetic campaign to secure the construction of permanent roads. An urgent appeal is made to business men and taxpayers to assist the work, as the association maintains that the state highway appropriation is likely to be reduced unless concerted action is taken.

According to a letter sent out by the association, the trunkline system of Connecticut consists of 1,420 miles of highway. By October 1, 1915, a total of 900 miles will be improved, leaving 520 uncompleted. However, only a small part of the 900 miles of improved road is of the hard surface construction. The association states that the annual expense of maintenance for this water-bound macadam type is from \$1,000 to \$1,200 a mile.

"If another 500 miles of water-bound macadam is built," says the letter in part, "the repair expense alone will be tremendous. Under present day traffic water-bound macadam is the most expensive road that can be built, if original cost and maintenance are both considered."

The state highway commissioner has asked for an annual appropriation of \$500,000 for renewals and reconstruction of trunklines, and \$500,000 for trunkline repairs.

ENFORCING OLD ORDINANCE.

The authority for the police to seize any vehicle left unattended on the streets is given by an ordinance contained in the charter of New York City for 17 years, and this ordinance is now being enforced. This law classes such vehicles as encumbrances. However, the city officials state that the action is directed towards the garages, whose owners, they maintain washed, stored and repaired cars in the streets.

SUGGESTIONS FOR THE NEW CAR OWNER.

Describing the Components of the Valve Mechanism With Special Reference to the Model T Ford Motor—How the Valves Are Timed.

(By C. P. Shattuck)

The fourth article of the serial dealing with the construction, operation, care and repair of the model T Ford automobile, explains how the valves are operated and timed. The position of the pistons during each of the strokes is shown by a diagram and the operation of the cams made clear by illustrations.

IN THE previous article it was stated that the function of the intake valves was to admit the explosive mixture; that of the exhaust mem-

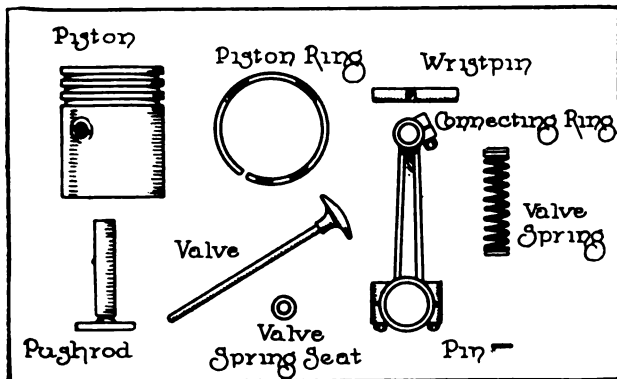


Fig. 6—Showing Piston Components and Members of the Valve Assembly.

bers to permit the burnt products of combustion to escape. As these members must open and close at a predetermined time, and remain closed during certain strokes, it is obvious that the mechanism actuating them must be accurate in its performance.

The term "mechanically operated valves" is derived from the components of the valve mechanism, which is depicted at Fig. 6, and which was shown assembled in Fig. 2. It includes the valve proper, valve spring, valve spring seat, pin, pushrod or tappet, cams and camshaft. The last named member is actuated by the crankshaft through gearing.

L Head Type Motor.

The Ford motor is of the L head type, having both the intake and exhaust valves on the same side. As there are four cylinders there are eight valves, four intake and a like number of exhaust members. Fig. 5 showed their arrangement in the cylinder heads.

The valves are made in two pieces, the head and the stem, then joined to make a solid con-

struction. The head is provided with a bevel seat, which fits a similar bevel in the cylinder head, and extreme care is exercised in cutting these seats and in grinding them with an abrasive to make the fit gas tight. This is known as grinding in the valves, which work is performed when the seats leak or become carbonized.

The valve stem moves freely through a bushing in the cylinder head, as shown at Fig. 8. As it is important that the valve heads seat firmly when the valve is closed, a coil spring is employed, called the valve spring. The upper end of the spring rests against the cylinder head and the valve stem passes through the open space in the spring. By compressing this spring and securing its lower end to the lower part of the valve stem, the tendency is for the spring to pull the valve downward, keeping it on its seat. The tension of the spring, however, is not so great that it cannot be more compressed, and this occurs when the valve stem is lifted by the pushrod. The spring rests in a seat and a pin is employed to retain it.

Function of Pushrod.

The pushrod, so-named because it pushes against the stem of the valve, causing the latter to lift from its seat, is a movable member, occupying a vertical position in the upper half of the crankcase. Normally, when the valve is seated

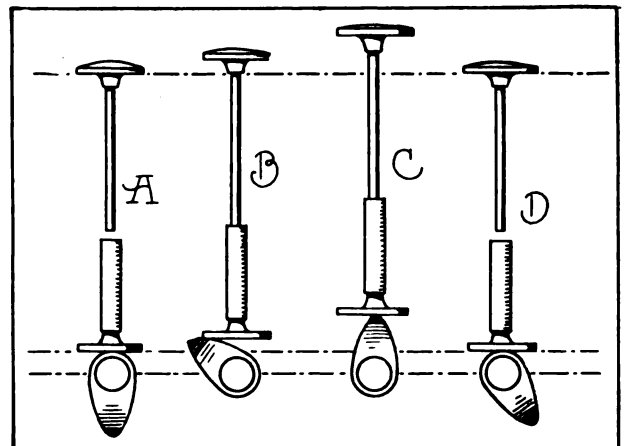


Fig. 7—How Cams Actuate the Valves: A, Valve Seated; B, Cam Beginning Lift; C, Valve Fully Open; D, Valve and Cam Inactive.

there is a slight space between the pushrod and the end of the valve stem, which is known as the clearance. When this space is greater than originally intended, the valves start to lift late, affecting the efficiency of the motor, as will be explained in logical sequence.

The lifting of the valves from their seats, and holding them open until the desired strokes have been completed, is obtained by the use of cams. There are eight of these members, one for each valve, and they are so arranged on the camshaft that they actuate the valves as required in the operation of the motor.

A working diagram of the cams and valves is shown at Fig. 7, the size of the cams being exaggerated to make clear their operation. When the intake valve, for example, is closed or in a normal position, the cam is as shown at A. Upon the camshaft revolving its extension or lip comes

be remembered that to obtain a power stroke the crankshaft makes two complete revolutions, or it completes one rotation to obtain two strokes. If the camshaft were driven at motor speed, the valve would remain open for half a revolution every turn of the crankshaft, whereas it is only required to open once every two revolutions. If it be borne in mind that both the intake and exhaust members open but once in four strokes and remain closed during the balance, the operation of the cams will be easily understood.

Timing of Valves.

The usual method of timing the valves of a motor is by utilizing the flywheel, the periphery of which is laid off into degrees. With the Ford motor the piston travel is employed, as the flywheel is enclosed and includes the device for generating electricity for ignition.

The timing plan is shown at Fig. 8 and should

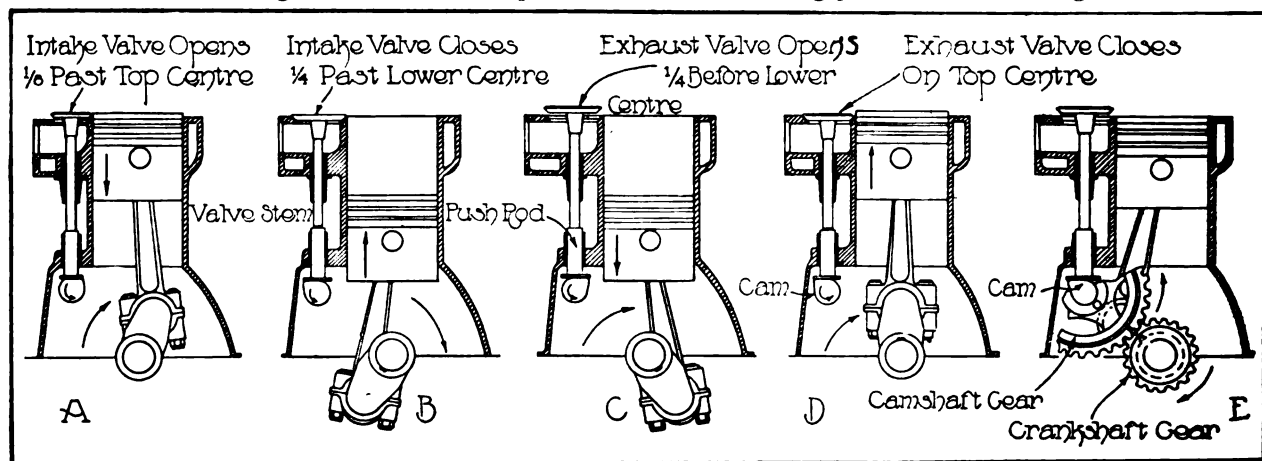


Fig. 8—Timing Diagram of Ford Motor, Showing Position of Pistons and Valves During the Four Strokes—The Illustration at E Depicts the Proportions of the Gears Actuating the Camshaft.

in contact with and raises the pushrod, as shown at B. Upon the cam attaining the position indicated at C, the valve has attained its maximum lift or is fully open. The position A to C inclusive represents approximately a stroke of the piston, which in this instance is the intake stroke. Upon the piston starting its upward or compression stroke, the cam revolves to the position shown at D when the valve is seated. The exhaust valves are operated in the same manner.

Camshaft Necessary.

The camshaft is parallel to the crankshaft and the former is actuated by gearing. The camshaft carries a gear twice as large as that fitted to the crankshaft, and having twice as many teeth is called the 2:1 or timing gear. The proportions are depicted at E, Fig. 8.

The reason for the camshaft making one revolution to two of the crankshaft will be understood when the strokes are considered. It will

be understood with a little study. The intake valve opens when the piston is $\frac{1}{8}$ inch past top dead centre, or, in other words, has started on the down or suction stroke. It closes $\frac{1}{4}$ inch past dead centre. Thus it will be seen that the piston completes its full stroke and travels an $\frac{1}{8}$ inch on the upstroke before the intake valve closes.

The timing of the exhaust valve differs from that of the intake. It opens $\frac{1}{4}$ inch before the piston completes the firing stroke, or $\frac{1}{4}$ inch before lower dead centre, and closes on top dead centre.

In assembling the motor at the factory the crankshaft and camshaft gears are meshed in a certain defined position as indicated at E. Any variance of this arrangement will cause the valves to open earlier or later, according to change in the mesh, and it is folly for the novice to attempt to improve the factory timing.

TY COBB BUYS WHITE SIX.

Ty Cobb, the crack outfielder of the Detroit American League baseball team, has purchased a 60 horse-power White "Six," made by the White Company, of Cleveland, O. While this noted player has won several automobiles offered as prizes for playing superiority, yet he decided to buy a White car, as it is, in his opinion, the one that fully measures up to his ideal.

One of the Georgian's hobbies is automobiling, and all his spare moments off the diamond are devoted to this pleasure. Cobb is generally conceded to be one of the most careful students of the game that ever wore a glove. He goes into every detail of play with utmost care and many of his marvelous plays, most of them spectacular, are carefully planned long before they are executed. Having evolved a plan, Cobb patiently awaits opportunity to make the play, with results which invariably surprise the spectator. The White Company maintains that Cobb has used his characteristic careful study in making his recent purchase.

While this order was given by Cobb before he left his Georgia home in the spring to join his club in New Orleans, La., yet the White Company but recently received orders to ship the car to him at Detroit, where he will keep it during the playing season. Like all players who own motor cars, Cobb gets plenty of opportunity to enjoy his machine while his team is playing at home. After the close of the season, Cobb will send his car to his Georgia home.

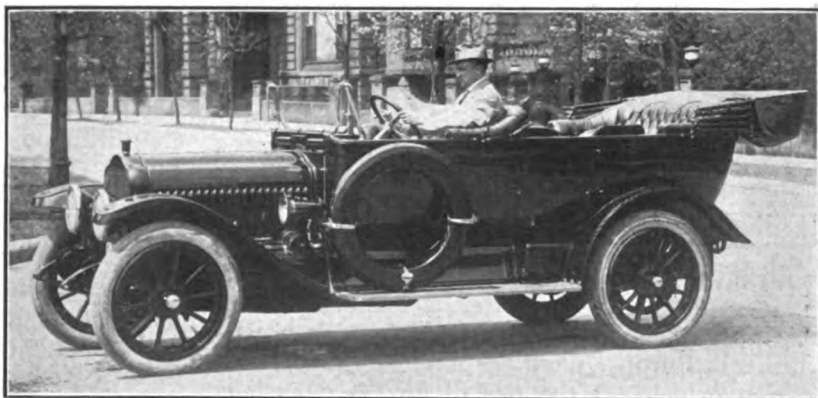
GERMANY'S 93,072 AUTOMOBILES.

The German Empire has less automobiles than New York, Illinois, California or Ohio, these states having more than 100,000 cars each, while the latest official statistics from Germany show a total registration of 93,072 cars at the beginning of this year. However, it is more than probable that by this time the number of cars in Germany has reached the 100,000. It should be remembered that the total given above for Germany includes passenger cars and cycles as well as commercial cars and cycles. Passenger cars on January 1 numbered 60,876, of which 15,188 were of

eight horsepower or less, 17,735 between eight and 16, horsepower, 25,734 between 16 and 40 horsepower, and 2219 of more than 40 horsepower. Of 9639 motor trucks in service at the beginning of the year, 2019 were of eight horsepower or less, 2259 between eight and 16 horsepower, 4549 between 16 and 40 horsepower and 812 of more than 40 horsepower. In both classes of automobiles, an increase of high-powered vehicles is revealed by a comparison with the statistics of former years. There were 22,457 motor cycles and 100 freight cycles in use the first of 1914.

THE ROAD DRAG APPROVED.

Department of Agriculture experts, who are cooperating with state and county officials in



Ty Cobb, Star Outfielder of the Detroit American League Club, at the Wheel of His New White Six-Cylinder Car.

work for better roads, declare the road drag is the simplest and least expensive means yet devised for maintaining earth roads. That there is plenty of work ahead for the road drag is shown by the fact that of the 2,000,000 miles of public roads in the United States, only about 200,000 have been improved.

AUTO MAKERS TO TOUR EUROPE.

About 150 members of the Society of Automobile Engineers are expected to make the next European tour, beginning October 9. The party will be the special guest during its travels through France, of the Automobile Club of Great Britain. The itinerary will include Paris, Turin, Milan, Lucerne, Neuhausen, Stuttgart, Mayence, Cologne, Essen, Brussels and Antwerp, where the party will embark for London, November 5. After a nine-day stay in London, the tourists will return to New York.

FOREIGN MECHANICAL DEVELOPMENTS.

The Cary Compound Semi-Elliptic and the Houdaille Adjustable Springs to Absorb Road Shocks--The Lamplough Balanced Worm Drive.

IT is well known that the chief shortcoming of present-day spring construction is its lack of adaptability to variations of load and running condition; that is to say, while there exist devices which overcome the difficulty of this problem, they are hardly used by the countless army of motorists, partly because these accessories are relatively little known generally to the motoring world, and partly because of a general lack of interest, which is, moreover, coupled with scepticism. Nevertheless, as has been stated,

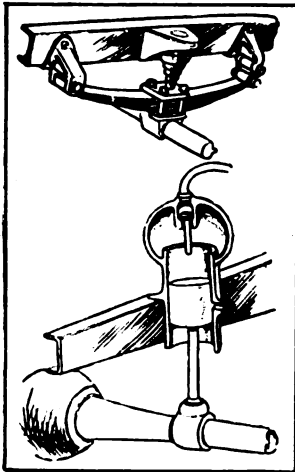


Fig. 1—Houdaille (Upper) and Cary (Lower) Spring Suspensions.

a number of such devices exist and are in practical use in Europe. They are founded upon either of two principles: the use of auxiliary springs which become operative as soon as a certain load is placed upon the chassis, and the provision for adjusting the spring itself to the varied requirements determined by the load carried.

One of the simplest compound springs, which includes an auxiliary device, is Cary's semi-elliptic design, Fig. 2. The model here illustrated uses two sets of spring leaves arranged on a common centre bolt and held together on each side by a bracket. By suitably curving the various sets of leaves, they may be brought into action gradually, the action of the spring being therefore, within limits, proportionate to the weight resting upon it.

Fig. 2 shows the scheme utilized on the London General Omnibus Company's 'buses in London. If the load is increased, additional stiffness of the spring is obtained through the use of a volute spring, the outer end of which is secured to a projection of the chassis frame, while the inner end, as soon as the chassis is weighed down to a definite point above the axle, bears upon the

bolt-head plates of the springs with a force increasing approximately in the same ratio as the load. This coil spring has very little internal friction and consequently there is less tendency under full load to dampen oscillations than in the Cary construction.

With both these compound springs, the stiffness increases with the deflection of the spring, caused either by increased load or road inequalities. The latter case is dangerous to the spring, as the rebound is apt to break a leaf, or several of them. Nor does the compound spring give one the benefit of the full range of deflection; under light load it works mainly over the upper portions of the range and under heavy loads over the lower portions. Hence, a vehicle with compound springs will be more comfortable at half load than one ordinarily sprung at full load, because the latter springs are designed for this condition.

An example of adjustable spring design is the patented device of the Societe Houdaille & Sabot, makers of a hydraulic suspension, which device formed part of the equipment of the winner of the recent British Tourist Trophy Race. In this device, the right and left hand screws actuate blocks sliding on the frame to which rollers are attached, which bear on the ends of the master leaf. Two screws, one on each side of the car, are coupled together by a chain which runs over

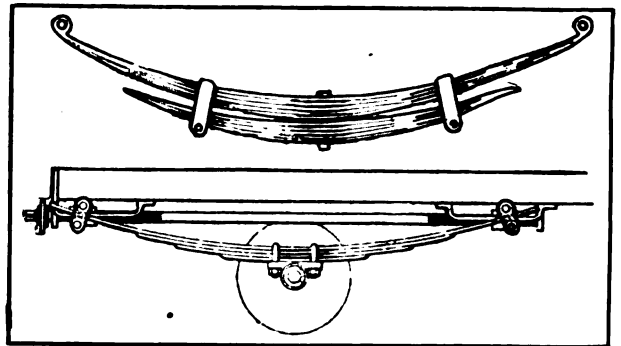


Fig. 2—Upper View, Cary's Semi-Elliptic Design; Lower, Omnibus Spring.

sprockets; so that if one screw is turned the other is adjusted equally. This spring is the weaker, the more its length is increased, greatest

stiffness being obtained by shortening of the master leaf.

The Cary pneumatic suspension, Fig. 1, supports the car weight by pistons working in cylinders which contain compressed air. The piston is connected to the axle as shown and its up-stroke compresses the air further; the capacity of the piston chamber determines the stiffness of this system. The piston controls a valve admitting compressed air from a tank to compensate for losses of pressure. Any increase of weight causes an automatic admission of additional air to the cylinder, thereby increasing the stiffness of the spring, and vice versa, there being an escape valve for lessening of load.

FOUR-WHEEL DRIVE TESTS.

Latil and Renault Winners in the Trials Held by French Minister of War.

The results of the military four-wheel drive tractor competition held by the French Minister of War last March have just been announced. The trials were the first of the kind, and took place over country and military roads in the east of France. The machines were subjected to very severe tests, which were followed by a technical examination at the artillery headquarters near Vicennes. Merit points were awarded for regularity of operation, hill climbing, economy of fuel and oil, and condition of machines at finish. The Latil No. 9 led the class for light tractors with a total of 810.7 points, with the Panhards second and third with 773.6 and 743.6 points, respectively. Both of the last named machines were equipped with Knight motors. The Renault machines Nos. 11 and 12 led in the class for heavy tractors with 949.3 and 943.8 points, respectively. Two Latils finished third and fourth.

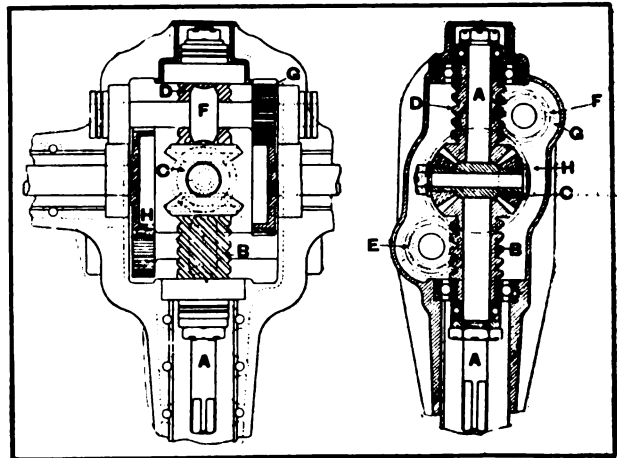
AUSTRIAN ALPINE TOUR.

Out of 75 cars which started from Vienna on the Austrian 1824 mile Alpine Tour, 60 cars finished after eight days of running and two of resting, thus averaging 228 miles of extremely mountainous territory a day. Among the finishing cars, 16 had clean scores, 32 had penalties and 12 were non-contestants. Of five American cars which started, three Cadillacs finished. The list of clean scores includes five Audi cars, three Austro-Daimlers, three Fiats, two Minerva-Knights, one Benz, one Rolls-Royce and one Opel.

LAMPLOUGH WORM DRIVE.

By using a balanced worm drive, F. Lamplough, an English engineer, claims to have overcome that lack of resistance in the differential which causes it to operate not only when the car is turning, but also when one wheel skids on or bounces off the road, so that the other tire is made to creep. At the same time, the above-mentioned device, which was described in The Autocar reduces the friction in the differential gearset, so that an increase in its efficiency results, as the ordinary worm drive always is accompanied by a backward thrust equal to the forward, which causes a considerable amount of power to be lost in the form of friction.

The construction of this new device is here illustrated. The propellor shaft A carries the left-hand worm B, the differential C and the



Sectional Views of Lamplough Worm Drive.

right-hand worm D. B meshes with the worm-wheel E beneath it and D with the wheel F above it. At the right end of the spindle, which carries F, the driving pinion G is in place, which meshes with the driven pinion secured to the inner end of the right axle shaft; the left axle shaft is similarly actuated. Thus, clockwise rotation of the propeller causes the pinion E to rotate rearward, turning the axle forward. In the same manner, F is rotated rearward and its axle section forward.

The National Automobile Chamber of Commerce will hold a convention of commercial vehicles interests next October. The meeting will be for the purpose of further advancing the work already undertaken by the chamber's commercial vehicle department and for promoting the industry as a whole.

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GOVERNOR WALSH'S SIDESTEP.

After making an unsolicited pledge to the motor vehicle owners of Massachusetts that he would not approve legislative acts inimical to their interests, Governor Walsh was visited by a committee representing the motor truck owners of that state and asked to veto a bill increasing the registration tax from a flat rate of \$5 to a sliding scale with a minimum of \$5 for one ton and \$3 additional for each additional ton or fraction. He received the remonstrants, assured them of his fullest consideration and signed the bill the same day. While this directly affects the truck owners, the army of about 100,000 motorists of the Bay state keenly resent what they condemn as unwarranted breach of a promise fairly made and which they were justified in expecting would be kept. They do not hesitate to say that Governor Walsh's act has seriously affected his political future.

MOTORIZING MAIL SERVICE.

The House Committee on Post Offices has amended the Moon omnibus post office bill, which will establish the salary of rural mail carriers who use automobiles at \$1800 a year. The

present maximum is \$1200 a year. Carriers for the rural delivery routes must maintain their own equipment, and the increase of pay will justify the purchase and operation of a serviceable motor car. The Postmaster-General has recommended that the length of the routes be increased from the present average of 24 miles to 50, which will necessitate the use of automobiles. The general public will be materially benefitted, inasmuch as what may be regarded as a city service will be extended through rural communities not now served.

SUNDAY AND SAFETY FIRST.

The daily press is commenting freely editorially upon the Sunday motor car accidents, and suggestion is made that the limit of speed be reduced as a remedy. A strict observance of the recommendations prescribed and circulated by the National Council for Industrial Safety would be more effective. The rules are simple. Drive slowly when passing children and vehicles, when approaching crossings and turning corners. Stop at railroad crossings and behind standing street cars, and use chains on slippery thoroughfares. When in doubt, drive slowly or stop. Eternal vigilance is the price of safety, and with it must be combined cautious and considerate operation of the motor vehicle.

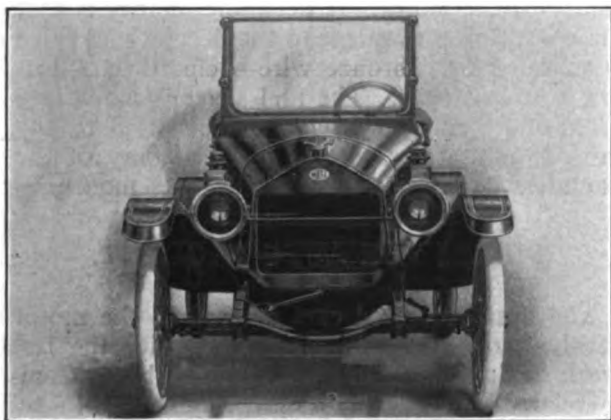
RHODE ISLAND ROADS.

Tourists using the shore road between Westerly and Narragansett Pier, Rhode Island, a much travelled thoroughfare at this time of the year, state it is in a very bad condition. That highway between Charlestown and Westerly, a distance of approximately 13 miles, is so rough and full of holes that many motorists make a detour over the old road to Kenyon and Carolina, thence to Westerly over the state system. Some of the more recently constructed tar roads are not in as good condition as those built a year or more previously. It is to be regretted that after expending thousands of dollars to build new roads that these should be allowed to deteriorate.

Machinery has destroyed the old social life of the rural districts, and the husking bee and barn raising are no more, states a daily paper. True, but the gasoline motor has lightened the labors of the farmer, to say nothing of bringing him in touch with the city market. To the farmer the automobile is a great economy.

NEW BODY FEATURE OF 1915 METZ "22."

CONTINUING the construction of the car which has been proven so thoroughly in the past, the 1915 Metz "22," built by the Metz



Front View of New Metz Fore Door Body.

Company, Waltham, Mass., differs from former designs chiefly in the body. The body is a stream-line type, with a sloping bonnet and cowl dash, the gasoline tank being carried under the cowl. The windshield is attached at the rear of the cowl. Both windshield sections swing for rain vision. The driver's compartment is roomy and comfortable, the upholstery is deep tufted, and, to give protection against rain, the top is designed to fit closely over the windshield. The top is fitted with a slip cover and curtain. Included in the equipment are Prest-O-Lite headlights, a tank and side and tail lamps.

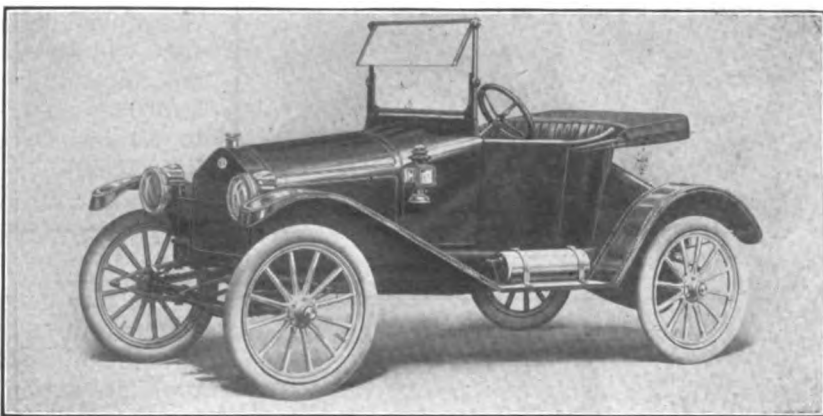
The body design of the 1915 Metz is semi-enclosed, and is a modification of the fore-door type. It is claimed for this arrangement that ample protection is afforded passengers and at the same time the trouble of opening and closing the doors is eliminated. The rear seat is covered by a compartment, which may be reversed and replaced by a torpedo tool chest, luggage or one or two rumble seats. The top is constructed with the idea of utilizing it, when not raised, as a dust shield. As to mechanical detail, the Metz motor is a water-cooled, four-cylinder, L-head, block-cast type, rated at 22.5 horse-power, the the cylinders having $3\frac{3}{4}$

inch bore and four inch stroke. The upper section of the crankcase is cast with the cylinder block, and the cylinder heads are detachable. An automatic float-feed carburetor, high-tension magneto ignition and mechanical-feed constant-level lubricating system are included in the power-plant. The friction type of power transmission, which affords any number of speeds and always the power required by road and grade, drives the jackshaft, whence the power is transmitted by side chains to the rear axle.

Hill Climbing Abilities.

It is the claim of the Metz Company that Metz cars can climb Prospect Hill, Waltham, Mass., on high. This grade varies from 5 to 21 per cent. But the company more than proved its claims for hill-climbing when its car won the Richfield Springs, N. Y., hill-climbing contest on July 4, one, two, three. To do this all the little Metz machines defeated a field of 12 cars, including several high-powered and much more costly cars.

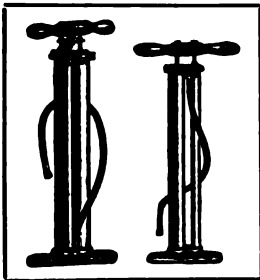
All the parts of the 1915 Metz can be removed with ease. The motor is so designed that almost any work necessary can be done without removing it from the chassis. The head is removable, which permits free access to the pistons, cylinders and valves. To detach the valve enclosure, necessitating the removal of but three bolts, is the work of but a few moments. The dust or sod pan under the motor and transmission are not solidly rivited to the frame, as is the usual custom, but is held in position by spiral springs so it is easily removable. Likewise, the chains may be easily inspected.



The 1915 Metz New Fore Door Body, with Built-in Windshield and Fuel Tank in the Cowl.

APEX AND ZENITH TIRE PUMPS.

The Buffalo Auto Accessory Manufacturing Company, 269 Ellicott street, Buffalo, N. Y.,



Apex and Zenith Tire Pumps.

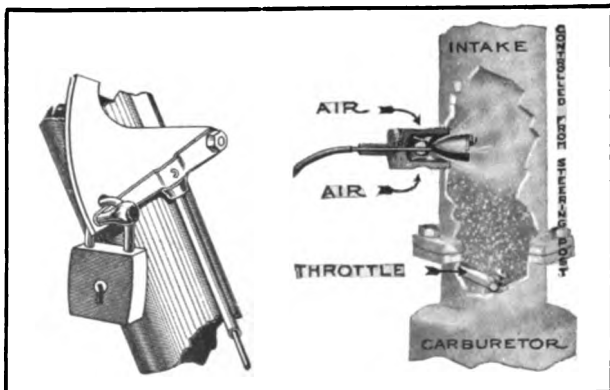
manufacture the Apex tire pump which is of the three-cylinder type and 22 inches long. The cylinders are made of brass tubing, with Bessemer steel plunger rods and "B" leather washers; the base is of heavy grey iron and gold finished. According to the maker's statement this

pump can inflate an average time in 30 seconds, being so constructed that it operates with extraordinary ease. The Zenith is a two-cylinder pump made of the same high grade material as the Apex, and is as efficient in operation.

SAUNDERS FUEL SAVER.

The Powers Sales Company, 122 South Michigan boulevard, Chicago, is marketing the Saunders gasoline saver, made by the Leslie R. Saunders Company. The instrument is fitted to the intake manifold of the motor between the carburetor and the cylinders, and sprays air at high velocity into the carburetted fuel, insuring a homogeneous mixture. It is easily installed.

As may be noted from the accompanying illustration, the air enters the valve through four large holes, the volume being regulated by a taper plunger that is air tight when seated. The total movement of this plunger is but 9-16 inch,



Saunders Fuel Saver: At Left, the Control Lever Locked; at Right, Sectional View Showing the Air Apertures and Valve.

and to obtain the maximum opening the control level, also shown in the illustration, must be moved nearly two inches. The operation of the

car may be prevented by moving this lever to the lowest position and securing it with a miniature padlock.

The maker states that the Saunders fuel saver will require no attention after installation, that it can be utilized as an air brake when descending hills and that it will greatly increase the efficiency of the motor. A desirable quality is that the control is convenient to the driver. The valve is actuated by a bronze wire enclosed in a flexible seamless tube. The fuel saver is made in a brass and nickel finish, and can be fitted to any car. It is stated that the fuel economy of the Saunders device will save its cost in a month.

PRIZES FOR AUTO PAGEANT.

The best decorated cars entered in the motor carnival to be held in New York City the last week in September in connection with the Commercial Tercentenary Celebration, will receive \$5,000 in prizes. In addition to this, a number of automobile accessory makers and others will donate prizes. These awards will be trophies or cups for private owners and cash for professional chauffeurs.

There will be a special section for out-of-town automobile clubs, a number of which will strive to win some of the prizes offered. No entry or registration fee will be charged and the commission will furnish artists to design floats and decorative schemes free of charge, if entrants so desire.

AUTOMOBILE SERVICE BUREAU.

The Manufacturers' & Dealers' Motor Underwriters has changed its plan to serve as general agents for the Fidelity Underwriters and the United States Casualty Company in the writing of automobile insurance. The present organization will be translated into an extensive automobile service bureau for the purpose of affording an inspection and adjustment service to all insurance companies writing motor car insurance.

PITTSBURG GARAGE ORDINANCE.

The city council of Pittsburg, Penn., has adopted an ordinance providing that public garages must be of fireproof type. The ordinance also prohibits automobiles being placed in any building occupied as a hospital, theatre, church, school or as a boarding, lodging or tenement house.

CORRESPONDENCE WITH THE READER.

Magneto Timing—Reader, St. Louis, Mo.

As a new subscriber of your magazine I should like you to explain the timing of a magneto by the piston travel. If you could publish a drawing it would be of great assistance to me.

By the term piston travel as applied to the timing or setting of a magneto is meant the location of the piston when the magneto is connected to the driving member. This is determined by the designer of the motor and the directions should be complied with in replacing the magneto.

As the spark is supposed to occur after the mixture has been compressed by the piston, the location of the latter when timing by it is important. By referring to Fig. 1 A it will be noted that the piston is within $\frac{1}{2}$ inch of completing the compression stroke. In this instance it is assumed that the factory timing plan calls for this amount of advance; that is $\frac{1}{2}$ inch before top dead centre.

Consequently the motor is cranked by hand until the piston of the first cylinder begins its upward movement, stopping when it is within $\frac{1}{2}$ inch of the top of dead centre. If a petcock cannot be used to pass a wire through to locate the position of the piston, the crank throws may be utilized to ascertain the dead centre location as indicated at B. Generally a wire can be introduced through the valve port into the combustion chamber or petcock, and with the wire in contact with the top of the piston, the flywheel is turned backward until the wire has descended $\frac{1}{2}$ inch.

Having made sure of the proper location of the piston, the driving member is connected to the shaft of the magneto. It is important that the armature be revolved until the figure 1 appears in the indicating window as shown at A, this denoting that the distributor brush is in contact with the segment to which is connected the cable leading to the first cylinder. If the magneto is not provided with an indicating window it will be necessary to displace the distributor cover and rotate the armature until the contact points just begin to break with the distributor brush in a position to make contact with either the extreme left or right upper segment of the

distributor. Generally the magneto is coupled to the driving member so that the contact points just begin to separate. It is important that the proper gap of the contact points be observed.

The diagram shown at C illustrates the timing of the commutator and shows the position of the piston with the spark lever fully advanced and retarded, both in inches and degrees of the crank circle.

Master Vibrators—Skeptical, Washington, D. C.

Will the editor of the correspondence department kindly give me his personal opinion as to the practicability of a master vibrator with a multiple-cylinder motor? I hear differing opinions expressed, some of which come from experienced men who do not favor a master vibrator.

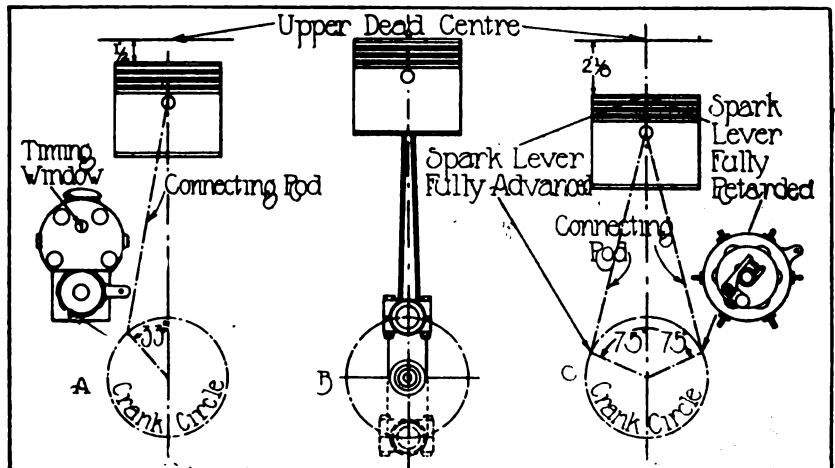


Fig. 1—Timing the Magneto by Piston Travel: A, Showing Piston $\frac{1}{2}$ -Inch Before Top Dead Centre and Position of Distributor of Magneto; B, Dead Centre or Completion of Compression Stroke; C, Illustrating Location of Piston with Spark Lever Fully Retarded and Advanced with Battery Ignition.

The writer is in favor of a master vibrator where multiple-unit vibrating coils are employed for ignition, for the reason that after a coil has seen some service the tension of the vibrators so change that it is extremely difficult to adjust them so that they will operate uniformly. The platinum points may differ as to the resistance set up to the passage of the current, and one or two plugs may give a hotter spark than the others, thereby providing a more rapid ignition of the mixture.

The advantage of the master vibrator is that being a single unit, the interruption of the primary current takes place in the same space of time for each cylinder; that is, there is no lag. For example: If 60 sparks are required a minute, the

vibrator will break the circuit every second. This is termed synchronization, and insures that the spark will take place with the piston in the same position for each cylinder.

The writer has fitted several master vibrators to cars and noted the results. He found that not only did the engine run more evenly, but there was less current drawn from the battery, and starting was much easier than formerly. There was a slight increase in power.

Electric Starter—Reader, New York City.

Why is it an electric starter won't start? A friend of mine owns a ——— car and in starting on a long trip the other day the starter made a few gasps and laid down, which led to the use of the hand crank. On the return trip the starter worked all right. Being curious I would like an explanation.

The conditions referred to would indicate that

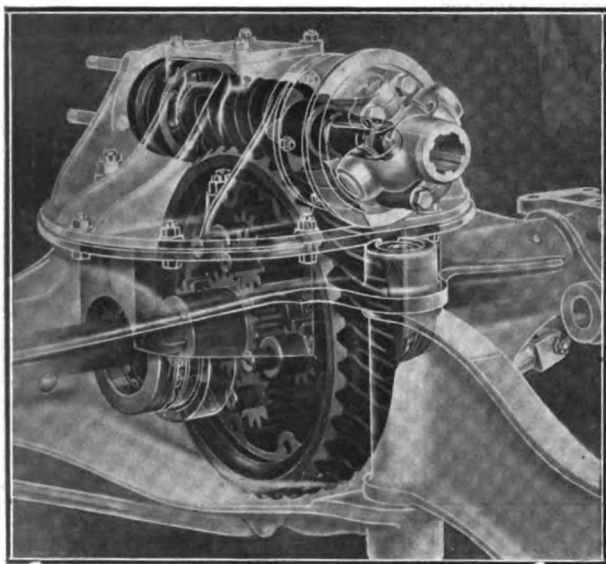


Fig. 2—Showing Overhead Worm Drive Used in Pierce-Arrow Trucks.

the battery was exhausted and that after continuous running of the engine the dynamo or generator charged it sufficiently to enable it to energize the electric motor starter.

The generator is utilized to maintain the battery in a properly charged condition, but if a large number of starts are made in a day, and the engine is not operated sufficiently, or at a speed necessary to cut in the dynamo, the supply of current will be diminished until practically exhausted. Storage batteries utilized with starting and lighting systems require attention and should be examined periodically and a reading taken of the electrolyte. If the instructions of the maker of the system were followed the trouble above referred to would be eliminated.

Worm Drive—A. L. B., Boston.

If you have a picture showing the construction of the worm drive such as used on the Pierce-Arrow trucks I wish you would please publish one of the same, as I am interested in this type of drive.

The illustration at Fig. 2 is a phantom view of the Pierce-Arrow worm drive which is of the overhead type. The faint, light lines indicate the differential housing.

Carburetion—Reader, Waterbury, Conn.

Am experiencing trouble with my motor. When running along on the high and about 12 miles an hour the motor misses, bucks and skips when I open the throttle. In a little while it will run all right, hitting four cylinders. It has been getting worse of late. What is the trouble? The valves, ignition and timer are in good shape.

The symptoms mentioned indicate mixture trouble. Generally an over-rich mixture will cause the motor to miss. From the description it would appear that the auxiliary air valve of the carburetor is sticking, as the engine runs smoothly after the throttle has been open for a little while.

Displace the air valve and spring and note if it slides freely on its guide. Sometimes the stem of the valve wears unevenly, causing the guide to catch. This may be tested by starting up the motor and noting if the air valve moves when the throttle is opened. The valve should move easily and freely on the guide and the tension of the spring should be light.

Right of Way—Constant Reader, Boston.

As a reader of your publication I wish to ascertain if the traffic rules of Providence, R. I., contain any provision for protecting the driver of a motor vehicle traversing a main thoroughfare. In a visit to the capitol of "Little Rhody" I narrowly escaped being run into by cars crossing a main thoroughfare upon which I was driving. And in every instance the drivers of these machines failed to sound their signal. I would state, however, that there were no traffic officers on this street which is, I am informed, a main thoroughfare.

During the traffic hours the officers regulate the conditions referred to. On other streets, however, there are no rules other than the general city ordinances which do not specify which machine or vehicle has the right of way; that is, no main thoroughfares are designated.

WAVERLEY'S 26 MILES FOR 10 CENTS.

A 1000-pound Waverley electric delivery wagon covered the 26-mile route from Buffalo to Lockport, N. Y., and return, carrying its full load one way and 900 pounds the other way, in 3½ hours. The current consumption was 105 ampere-hours, which cost 10 cents.

Headlights are not allowed to be used in Pittsburg streets on account of their glare, but side and tail lamps are required.

ARMY MOTOR TRUCK WIRELESS STATION.

ANNIHILATION of distance might aptly be chosen as the distinguishing characteristic of the 20th century. Motor vehicles transfer men and merchandise over hundreds of miles in a small fraction of the time formerly required to do this work. As for transmitting telegraphic information, the use of the motor vehicle has greatly increased the range of practical work.

It is only natural that military needs should utilize every progression of civilization, and, modern army equipment includes both automobiles and wireless telegraphy outfits. An efficient combination of these two utilities, however, seems to have been met by adopting a powerful automobile and a high-powered wireless outfit forming a self-contained unit with the car.

The United States army has acquired for its signal corps a truck built by the White Company of Cleveland, O., with the wireless equipment that can be set up for use in 12 minutes so as to send messages to any point within a radius of 800 miles if weather conditions are favorable. In some tests made, this truck has received messages from points 2500 miles away.

It is the speed with which this apparatus may be placed into readiness for operation, and its great power and extreme range of distance which make it unusually serviceable. The truck engine drives a powerful electric generator which delivers a 500-cycle current at 110 volts that raises from 18 to 32 amperes. The key-operated relay interrupts this current and transforms it so that its amperage is reduced to 8 or 12, while its voltage rises to 22,000. By the time the electricity has arrived at the top of the antennae, it has about 90,000 volts pressure, the amperage approximating zero.

The waves sent out under these conditions

have enough force to travel 800 miles under good conditions, that is, when there is little electric disturbances in the atmosphere which are created by various electrical power plants; under the worst conditions, however, the sending capacity of the outfit is 200 miles.

Coming to a detailed description of this equipment, the antennae, which is of the umbrella type, is mounted on the top of a mast 85 feet high, which is constructed of nine sections, eight of which are lifted by a block tackle suspended from struts which are mounted on a platform on the roof of the truck, but the first or top section is raised by hand. The guy wires are attached



United States Army Signal Corps Motor Truck Wireless Station: At Left, the Interior Equipment of a Special Body on a White Chassis; at Right, Crew Erecting an 85-Foot Sectional Mast Carried on the Machine.

to the fifth section of the mast. When not in use, this structure is taken down and the sections are carried in long compartments secured to the sides of the truck. As the wireless system of telegraphy necessitates a counterpoise, so called, or artificial ground, this is provided in the shape of several heavy insulated wires which radiate from a common center to which the ground wire proper is attached. To make grounding easy, a socket is provided on the side of the truck body, and a ground wire plug is designed to fit into this socket.

Ohio will expend \$15,000,000 this year for road construction and improvements. Three-fifths will be spent by the state department.

ANNOUNCE NEW MODEL IMP CYCLECAR.

THE W. H. McIntyre Company, Auburn, Ind., has announced the production of a new model known as "Imp the Second," which is built along similar lines as the original Imp, but includes a number of improvements of the first model.

In this machine, the four-cylinder water-cooled four-cycle motor cylinders are cast enbloc, with bore of $2\frac{3}{4}$ inches and stroke of four inches. The motor is suspended at three points. The motor has an aluminum barrel crankcase and the nickel-steel crankshaft is carried in two bearings; the connecting rods are heat-treated forgings. The inlet and exhaust manifolds are integral castings. A plunger oil pump insures positive lubrication and a thermo-syphon system of water circulation in combination with a large fan affords ample cooling.

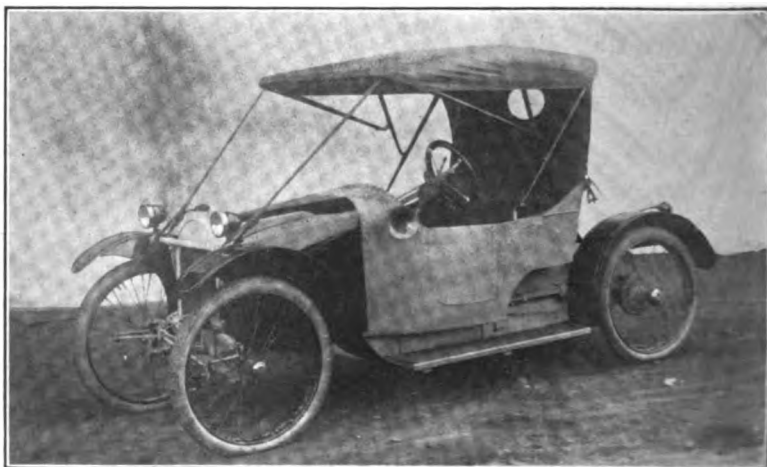
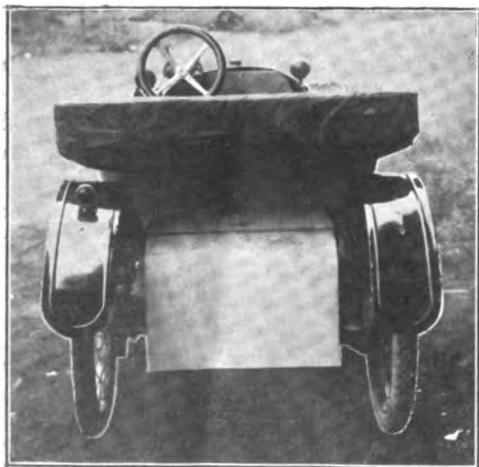
To insure the car having great hill-climbing capacity, the battery system of ignition has been used from the reasoning that it has a wide margin of safety; its current being just as powerful at low as at high motor speeds. Another feature of the ignition is perfect synchronism of the circuit breaker with the motor at all speeds.

Power is transmitted from the motor through a universal joint, propellor shaft and transmission, located under the seat, to a central pedal shaft and thence by a single roller chain to the live rear axle carrying the wheels, each of which includes a gearless differential to prevent skidding when the car turns a corner. The transmission system consists of a pressed-iron disc attached to the propellor shaft, against which

bears a paper friction wheel clamped in two metal flanges; the mounting of this wheel is such as to insure alignment in any position and render it proof against sliding when the car is turning a corner. There is also a provision for taking up wear on the compressed paper wheel. Any number of speeds is obtainable with this device, but four forward speeds and one reverse are registered on the notched quadrant to prevent a change in the relative positions of the two rotating friction members.

The rear axle, supported in roller bearings, carries the 28-inch wire wheels, which have solid hubs integral with the gearless differentials and the pedal-operated internal expanding service brake. The front wheels, of the same dimensions, have adjustable self-contained ball bearings. The tires are 28 by $2\frac{1}{2}$ inches all around. The foot lever-operated external contracting emergency brake operates on drums on the jack-shaft.

A rack and pinion steering gear is used, with a 14-inch wheel mounted at the left side of the car. Semi-elliptic springs in front and cantilever rear springs carry the torpedo-type streamline roadster body, upholstered with artificial leather. The seat is 37 inches wide and 16 inches deep with high back, and the compartment has two doors. The top is a Duquesne pattern and folds back so as not to interfere with driver or passenger passing through the door; a dust slip cover is fitted with every top. Under the cowl, the five-gallon gasoline tank is located in an accessible position. The tank is high enough to



The Imp, the Second Cycle Car, Built by the W.H. McIntyre Company. At Right, a Three-Quarters View of the Fully Equipped Machine; at Left, the Rear of the Body, Showing the Ample Storage Space.

assure positive feeding of the carburetor on any grade. This model has running boards.

The equipment of "Imp the Second" includes a six-volt electric lighting system, two headlights and a tail lamp being supplied with current from special dry cells. Starting is by a cable attached to a hand lever in easy reach of the driver. The cable is wound automatically by a clock spring and turns the motor crank when pulled by the driver.

The new Imp has a 90 inches wheelbase and eight inches clearance, weighs 850 pounds

DAVISON'S VIXEN WINS RACE.

Takes 25-Mile Free-for-All International Contest at 51.2 Miles an Hour.

The Vixen cyclecar driven by Harry Davison in the first International Cyclecar and Light

TO PROMOTE CONTESTS.

Manufacturers' Association to Encourage Racing and Touring.

At a meeting of the Cyclecar Manufacturers' National Association, held in Detroit during the international cyclecar and light car race meet, Frank E. Spooner was elected secretary. Mr. Spooner has been instructed to open an office at 903 Free Press Building, Detroit, as the first step of carrying on active organization work.

At the same meeting W. Irving Twombly, of the Twombly Motor Corporation, New York, and W. C. Lumb, of the Flagler Cyclecar Company, Sheboygan, Mich., were elected directors to fill two vacancies.

A contest committee was appointed and the matter of classification and arrangement of pro-



Contestants in the Second Run of the Cyclecar Club of New England at Haverhill, Mass., in the Noon Control.

Car Race at Detroit, Mich., July 4, starred by winning the 25 mile free-for-all, covering the distance in 29:18.1, and taking the prize from a field of eight contenders, including one French and one English car. Charles Coey in a Coey cyclecar was second, finishing in 30:19.4, and Clancy in a Twombly was third in 30:24.3. Another Twombly car was fourth and a Baby Peugeot fifth, although great things had been expected of it.

The Morgan three-wheeler, made in England, led for a time, but was disabled by a broken steering gear in the ninth lap. Before this, however, it had won a one-mile free-for-all for class A cars and a five-mile free-for-all for stock cars. Davison won also a one-mile free-for-all for class B cars in 1:12.1, and a two mile race for the winners of other events in 2:35.4.

grams of racing events was taken up. The manufacturers decided to encourage the promotion of contests of every character, including track races, hill climbs, road races, and every form of touring, in all sections of the country.

The members expressed themselves as highly pleased with the results of the contests at Detroit, believing that the endurance and speed of the cars in many long races had proven a demonstration of inestimable value to the industry.

The first cyclecar reliability run in America is scheduled to take place on Sept. 5, 6 and 7. The route will be from Newark, N. J., by way of Atlantic City to Philadelphia. Each car will carry an official observer, who will note fuel and oil consumption, stops and repairs. Twelve silver cups are the prizes offered for perfect scores.

IN THE COMMERCIAL CAR FIELD.

Truck, Carrying Load of Six Tons, Hauls Trailer Weighing Nine Tons Loaded with 40 Ton Bank Door---Novel Use of Republic Chassis.

MOTOR trucks gave an extraordinary demonstration of their usefulness and efficiency a short time ago in New York, when a Hydraulic five-ton truck and a Sampson vehicle of the same capacity moved a 40-ton safety vault door, made by the Bethlehem Steel Company, from the East river to the National Park Bank, at Broadway and Ann street. The vestibule frame having been brought by way of the water, it was necessary to transfer it from the lighter on to a wagon by a crane. This done, a five-ton Sampson truck and an American-La France gasoline-hydraulic truck were hitched tandem to move the wagon, the wheels of which had settled in the asphalt pavement. Then the train started at seven miles an hour along the river front, turning into Fulton

ing 30 tons over eight miles of road in Long Island City, negotiating a 3.5 per cent. hill on the viaduct. Because the trailer was not equipped with brakes, 10 horses were used, two of which guided the pole and eight walked behind to hold it steady on the grades.

PURCHASE ARMY TRUCKS.

Nine Makers Share a Blanket Contract of War Department for 20 Machines.

Secretary of War Garrison has approved the bids of nine different manufacturers from whom 20 machines will be purchased for the quartermaster-general's department. The majority of the machines, and possibly all of them, will be delivered at Fort Sam Houston, Tex., which has been the mobilization point of the army serving along the Mexican border.

Bids were invited from the industry generally for differing types of cars and these were submitted at several places, including the headquarters



Hydraulic and Sampson Five-Ton Trucks Hauling a 40-Ton Bank Vault Door Frame on a Nine-Ton Wagon in New York City.

street and up a 3.5 per cent. gradient.

In the middle of this hill, the trucks were stopped as one of the men thought the rear wheel journals of the Hydraulic truck could not stand the speed. Starting up again, the trucks continued at three miles an hour, but when they had to stop on account of a team obstructing the way, the wheels of the wagon carrying the door sank so deeply into the asphalt that the wheels had to be jacked and boiler plate put beneath them to make further progress possible. This happened within 100 feet of the bank building.

Several days after, another Hydraulic truck hauled a trailer loaded with steel girders weigh-

ing 30 tons over eight miles of road in Long Island City, negotiating a 3.5 per cent. hill on the viaduct. Because the trailer was not equipped with brakes, 10 horses were used, two of which guided the pole and eight walked behind to hold it steady on the grades.

Velle Motor Vehicle Company, Moline, Ill.	5
White Company, Cleveland, O.	4
Lippard-Stewart Motor Car Company, Buffalo, N. Y.	3
Thomas B. Jeffery Company, Kenosha, Wis.	2
International Motor Company, New York City	2
Kelly-Springfield Motor Truck Company, Springfield, O.	1
Driggs-Seabury Ordnance Corporation, Sharon, Penn.	1
Lord Baltimore Truck Company, Baltimore, Md.	1
Federal Motor Truck Company, Detroit	1

The chassis only have been purchased and these will be fitted with bodies designed by the engineers of the quartermaster-general's department. These will not be uniform as they will be used for varying works.

GENERAL STORE ON A TRUCK.

E. A. Eriksen, Greenville, Mich., has a novel and interesting use for the motor truck, namely, its application as a mobile general store. In other words, he has equipped a 3000-pound Republic chassis with a special body fitted with suitable shelves and completely enclosed. Having filled it early in the morning with fresh products, he starts out making calls on the farmers of the neighboring country to supply them with what they need. He is paid in cash for all sales, and furthermore receives orders for his next call. He averages more than 70 calls a day, so that every week he visits approximately 500 families and sells to them groceries, provisions, fabrics and various other necessities.

This system of business has proven successful. In fact, the success surpasses Mr. Eriksen's expectation, but the simple explanation is that by bringing his store to the door of the customer, the merchant saves the latter's time, a valuable factor in farming work, especially during the summer. Furthermore, the merchant becomes personally acquainted with his trade and is able to look after it better than otherwise.

The truck used in this case is a standard chassis, the body, however, having been designed to meet the merchant's specific requirements and suggestions. The sides of the body are constructed with a number of doors, affording access to the interior.

British Highways Smooth.

Col. W. D. Sohier, chairman of the Massachusetts Highway Commission, who has just

returned from a trip to England, says British roads are perfectly smooth. In the cities he says the engineers have accomplished something that American experts declare is impossible; i. e., they have succeeded in laying wood block pavement flush with the rails of street car tracks, giving a smooth riding road. Col. Sohier says that constant repair and resurfacing is also a big factor in the success of the British roads.

GREAT BRITAIN SUBSIDIZES TRUCKS.

In its report on the recent trials of trucks, the British War office stated that most of the engines had between 350 and 400 cubic inches displacement as an average, the smallest having 317 and the largest 450 cubic inches. The specifica-



Republic Chassis with a Special Body, Which Is Stocked and Used for a General Store by E. A. Eriksen, Greenville, Mich.

tion of the war office for motor trucks to be subsidized call for a water cooling system including a pump, and all except 10 systems which were belt-driven, were operated by gears.

One interesting fact brought out by the report is that propeller shaft brakes were found to be superior, on the whole, to brakes carried in the wheel drums.

The average fuel consumption was one gallon for 54-gross ton miles, the best result being when one truck covered 200 miles at the rate of 63.3 miles a gallon. The previous best results were 59 gross ton miles a gallon for a whole trial and 68 gallons for a run of 200 miles, although considerably better results than these have been obtained on acceptance tests of new vehicles of the War Department pattern.

GARGOYLE BOOK ON LUBRICATION.**Construction, Operation and Requirements of Engine Lubricating Systems Are Defined.**

After explaining the principles of automobile motor operation, the Vacuum Oil Company, Rochester, N. Y., in a new booklet, "Lubrication of the Automobile; No. 1—The Engine," goes into the subject of oiling the motor with great detail, by first classifying oiling systems as follows:

Full Force Feed—Oil is forced by pump pressure to the main bearings and, by means of drilled holes in the crank webs, to crank pins and through hollow connecting rods, or oil pipes attached thereto, to the wrist pins. Oil returns to sump, or reservoir, and is circulated again.

Force Feed—Oil is forced by pump pressure, or the centrifugal force of the revolving fly-wheel, to main bearings and, through drilled holes in crank webs, to crank pins. The wrist pins and cylinders are supplied by oil thrown from the connecting rods. The connecting rods do not dip. Oil returns to sump, or reservoir, and is circulated again.

Force Feed and Splash—Oil is forced by pump pressure, or the centrifugal force of the revolving fly-wheel, to the main bearings and, through drilled holes in crank webs, to crank pins. The oil from the main bearings falls to wells in the bottom of the crank case, to adjustable troughs, into which the connecting rods dip and splash oil to all other parts of the engine. A constant level is maintained in the crank case by an overflow to the sump, or reservoir, below, whence the oil is circulated again.

Semi-Force Feed and Splash—Oil is forced by pump pressure to a sight feed on the dash and from this point flows by gravity to the main bearings. The oil from the main bearings falls to wells in the bottom of the crank case, or to adjustable troughs, into which the connecting rods dip and splash oil to all other parts of the engine. A constant level is maintained in the crank case by an overflow to the sump, or reservoir, below, whence the oil is circulated again.

Splash—Oil is supplied to the crank case. The connecting rods dip into and splash the oil to all parts of the engine.

In addition, the booklet takes up the question of carbon deposits and their removal, correct and incorrect engine lubrication, proper adjustment of the several parts of the power plant, and diagnosing and remedying engine troubles.

This booklet will be sent free to any motorist upon application to the manufacturer of Gar-

goyle Mobiloils, either at the Rochester headquarters or one of the many branches.

LAW GETS THE BIG FISH.

The amendment to the Massachusetts law which gives visiting motorists 30 days grace instead of 10 seems to some a boomerang. Under the provisions of the old law the visiting motorist could take out a three months' registration at one-half the regular fee, but now if he should desire to stay after the 30-day period the full yearly rate is charged. Over 900 motorists were licensed for three months last year.

NEW YORK'S BIG INCREASE.

During the first five months of 1914, 135,053 automobiles were registered in New York State, as compared with 107,299 for the same time last year. Of this year's registration, 62,134 cars include machines operated in Greater New York. The number of trucks registered before June, 1914, exceeds by far the total 1913 registration of commercial vehicles, according to Mitchel May, New York secretary of state.

TO CIRCLE GLOBE IN CYCLECAR.

Carl Stearns Clancy, of San Francisco, Calif., is preparing to make the tour around the world in a Twombly cyclecar. He has already once traveled around the earth on a motorcycle. After a transcontinental trip, Mr. Clancy will sail from New York about August 20 and on arrival in Europe will travel eastwards through Russia and Siberia.

SAVAGE 20 LIGHT CAR ANNOUNCED.

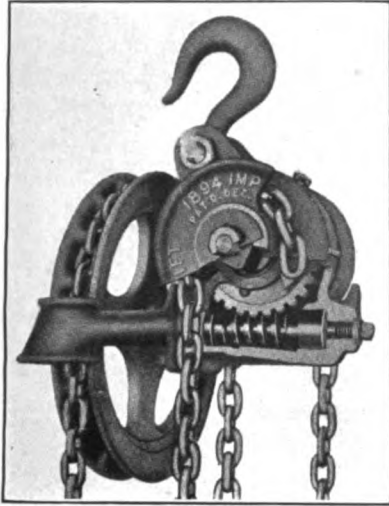
On Aug. 15 the first Savage 20 light car, selling for \$650, is to be placed on the market. It will be made by the Savage Motor Car Company, Detroit, of which Delbert H. Cummings is president, E. E. Taylor vice president and R. W. Fishback secretary, treasurer and general manager. The car will have four cylinders of 3.357x4.25 inches.

TOLEDO DEALER ENLARGES STORE.

The Toledo Rubber Company, Toledo, O., agent for G & J tires, National Telescope spark plug pumps, Ely-Ford shock absorbers and Wizard vulcanizers, has added 750 square feet to the floor space of its city salesroom.

MACHINERY, TOOLS AND SHOP EQUIPMENT.

HAND operated chain hoists, because of the ease of operation and general utility, are standard equipment in large repair shops and service stations.



Harrington Improved Screw Hoist.

Edwin Harrington, Son & Co., Inc., 17th and Callowhill streets, Philadelphia, manufactures a wide variety of chain hoists one of which, the improved screw hoist, is shown in an accompanying illustration.

It is designed to withstand severe service, and each component is subjected to rigid inspection before assembly. Each link of the chain is carefully tested. The maker states that it has been adopted by the United States government and is in use in a large number of industrial plants.

The worm gear, formerly of iron, is now made of bronze with square hubs, and is driven by a steel worm. The load wheels have square holes fitting squared hubs on the worm gear instead of clutches, increasing the strength and avoiding the liability of breaking. They are also reversible. It is pointed out that when one side of the pockets becomes worn, the wheels can be taken off and turned around, bringing the good side of the pockets into action.

The load is carried on two distinct chains, either of which is capable of lifting a load up to the full rated capacity of the hoist, thereby reducing opportunity of accident to the minimum. The load chain hook has a swivel connection, so that any twist of the chain may be straightened out without removal. A thrust screw and bronze washer at the end of the worm is instantly adjustable for obtaining fast or slow speed in lowering.

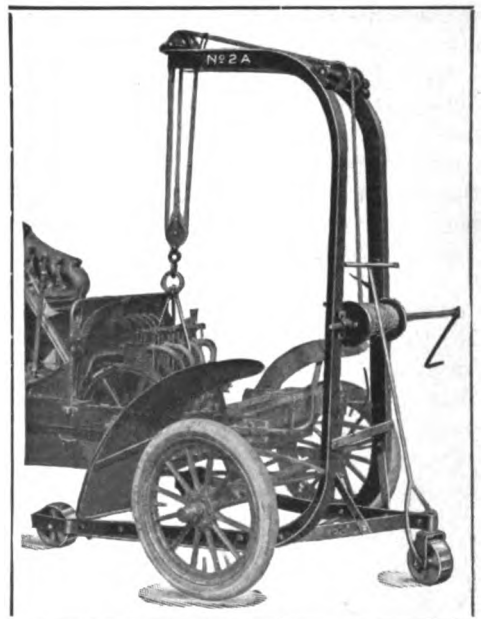
The worm and gear are enclosed in an oil tight housing containing a special hard grease. A new hand chain guard is so placed that the

operator can stand clear of the load without wasting time in dragging the chain in the guard. The hoists are made in capacities ranging from 500 to 30,000 pounds, and having lifts of from eight to 12 feet, respectively. The company issues a most complete illustrated catalogue on its product, which will be mailed free upon request.

HERCULES PORTABLE CRANE.

William Shelton Nicholls, Hoosick Falls, N. Y., is manufacturing the Hercules portable crane hoist shown in the accompanying illustration and it is designed for service in the factory, garage and repair shop. It may be utilized in repairing and for a number of other purposes, saving time and labor. A feature of the Hercules is that it is constructed of steel throughout and has solid frame pieces, top to bottom. The base or bed is low, permitting of its use from all sides of the automobile. As will be noted by the illustration, an extra length overhang brings the centre of lift or hoist directly over the motor. The wheels have a wide face and are mounted on roller bearings of ample size. An extension piece for the crank handles, extending these out beyond the mud guards, is standard equipment. The Hercules is made in 1000, 2000 and 3000 pounds capacity and is moved easily about the building. The height overall is

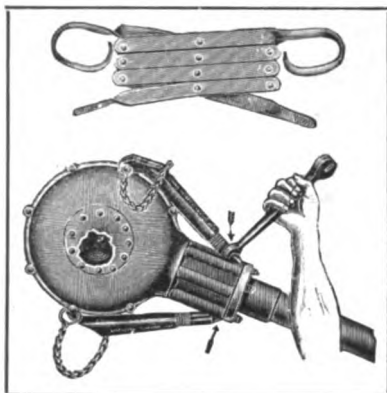
eight feet and the hoist has a capacity of six feet, 10 inches, sufficient to meet varied requirements. The maker will supply complete



Hercules Portable Crane, Having Extra Length Over-hang and Extension for Handles.

FORD HOUSING PULLER.

The Universal Manufacturing Company, Racine, Wis., is marketing a practical tool for



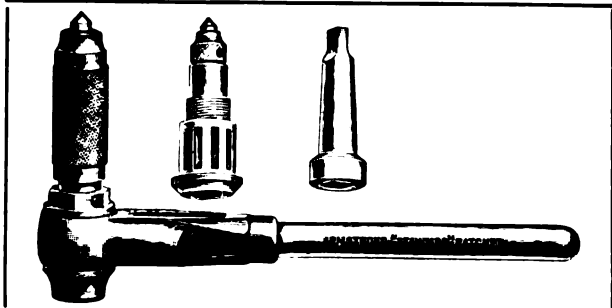
Universal Ford Housing Puller and Pliers.

garages and repair shops handling Ford cars. As may be noted in the accompanying illustration, the tool is designed to remove the propeller shaft housing from the differential. One of the qualities of the tool is that the housing can be removed without injuring its flanges. It is also stated that the device saves considerable time over the usual method of driving with a hammer. The Universal Ford housing puller is sold in sets of two and for a moderate price.

The company also markets extension pliers for reaching and removing nuts, bolts, etc., from places not easily accessible by the hands or with ordinary tools. With the Universal pliers the workman can reach into the pan, transmission, etc. The pliers can be extended 21 inches, and when folded as shown in the illustration is seven inches long and about three inches wide. The maker states that this tool will save its cost in a brief period of service. It is also practical for the motorist who maintains his own car.

ARMSTRONG RATCHET DRILL.

The Armstrong Bros. Tool Company, 357 North Francisco avenue, Chicago, Ill., is marketing a line of ratchet drills, one of which, the Standard combination, is shown in an accompanying illustration. The tool is designed for



Armstrong Standard Combination Ratchet Drill.

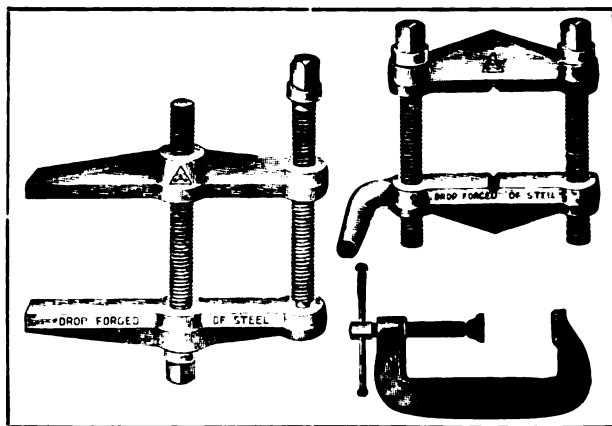
general service and for drilling or countersinking holes in material not easily accessible with ordinary tools.

The combination includes a sleeve ratchet for Morse taper shank drills, a square taper socket to fit the same and a short spindle with feed screw by which the ratchet can be converted to use square taper shank drills.

A quality of the Armstrong ratchets is that all parts are hardened. The Standard ratchet combination is made in five styles. The lengths are from nine to 22 inches. The company issues a complete catalogue, giving details and prices of its product, which will be supplied free upon request.

LATHE DOGS AND CLAMPS.

The Armstrong Bros. Tool Company, Chicago, Ill., has issued a new catalogue of drop forged lathe dogs and machinists' clamps, three types



Illustrating Armstrong Machinist's Clamp, Lathe Dogs and C Clamp.

of which are shown in the accompanying illustration. One quality of the clamp lathe dogs is that the under face of the screw heads is convex, fitting into a concave seat, and as the holes in the upper bar are larger than the screw, this allows considerable tilting without bending the screw. The dogs are produced in four sizes, ranging from $1\frac{3}{4}$ to $3\frac{1}{2}$ inches between the screws.

The machinists' clamps are produced in four sizes with openings from $1\frac{1}{4}$ to $4\frac{1}{4}$ inches. All parts are hardened and the faces are ground true. The under face of the centre screw is convex, fitting into a concave seat to allow tilting. The jaws are extra heavy and the maker states they will not bend or spring on a short bite. The C clamp is adapted to a large variety of work. It is produced with capacities of from two to 18 inches adapted for heavy work.

BOSCH BUILDS FULL CAR EQUIPMENT.

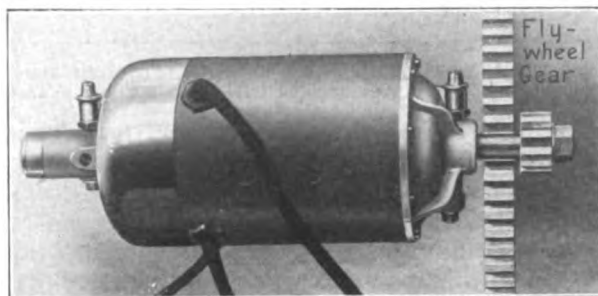
THE absorption of the Rushmore Dynamo Works, details of which are given elsewhere in this issue, together with the completion of a line of motor starters, will greatly increase the business scope of the Bosch Magneto Company, New York City, and its products for 1915 will be very much more general. The company now produces magnetos in a great variety of types, electric motor starters and generators, lighting accessories, starting switches, oilers, searchlights, a battery ignition system, control devices, spark plugs, etc. The Bosch Magneto Company occupies a unique position in the automobile industry in that, with the exception of electric horns, it can supply all electrical equipment needed or desired for the average modern car.

Diversity of Design.

The Bosch lighting systems include five different generators, with a diversity of design that the company may meet the many requirements as to mounting, drive and speed. The two Bosch motor starters are over-running clutch types and are 12-volt machines, the standard voltage of the company, such as is generally used abroad. The Bosch company states that it has overcome the obstacles to manufacturing lamps of this voltage, and that there is now an advantage in the use of a 12-volt system, as the current required for any particular lamp load is considerably less than with a six-volt system. As the commutator of the first-named system is smaller, the loss due to brush friction and electrical resistance is less.

The Bosch lighting generators were fully described in the Feb. 25 issue of the Automobile Journal. They are of the shunt wound type, and

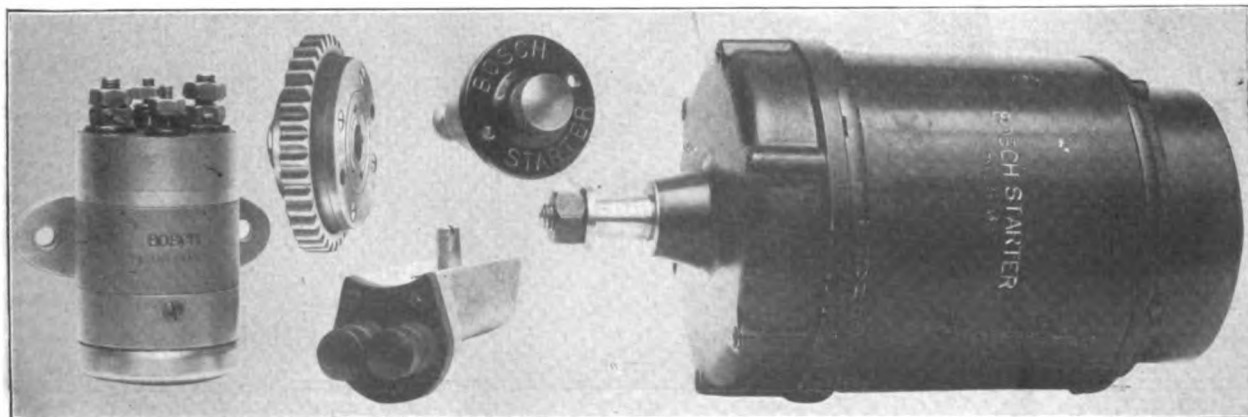
the excitation of the field magnets is governed by an automatic controller of the electro-magnetic type carried in the switchboard. This controller reduces the strength of the field as the speed increases and conversely increases the field strength as the speed decreases, thus maintaining the output of the dynamo constant.



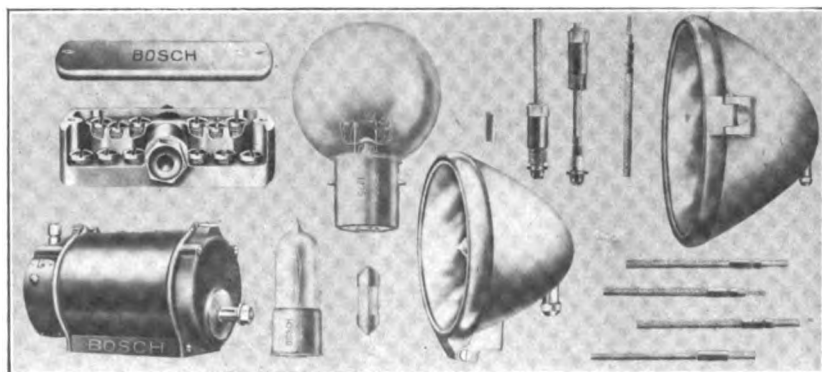
Bosch-Rushmore Starting Motor, a Type Especially Adaptable to the Used Motor Car.

The switchboard is a novel construction and is made for standard and cowl dashes. The switch is a kick type and affords use of the battery or dynamo, or both, for carrying the lamp load. A combination voltammeter is included, and the double reading scale shows both charge and discharge currents. A quality of the switch board is a removable key.

The Bosch Magneto Company will market two types of motor starters, the Bosch, which includes an over-running clutch, and the Bosch-Rushmore, which is a direct drive to the flywheel construction. Both will be wound for 12 volts, permitting of their use in conjunction with Bosch dynamos.



Bosch Starting Motor with Over-Running Clutch.—The Main Starting Switch Is Shown at the Left; the Small Lower Illustration Is the Pilot Switch Above Which Is the Automatic Ignition Switch.



The Bosch Dynamo with Magneto Shaft Height Drive and Base, and the Accessories Utilized with the System.

automatically pushes aside an arm which is connected to the ignition lever, retarding the spark.

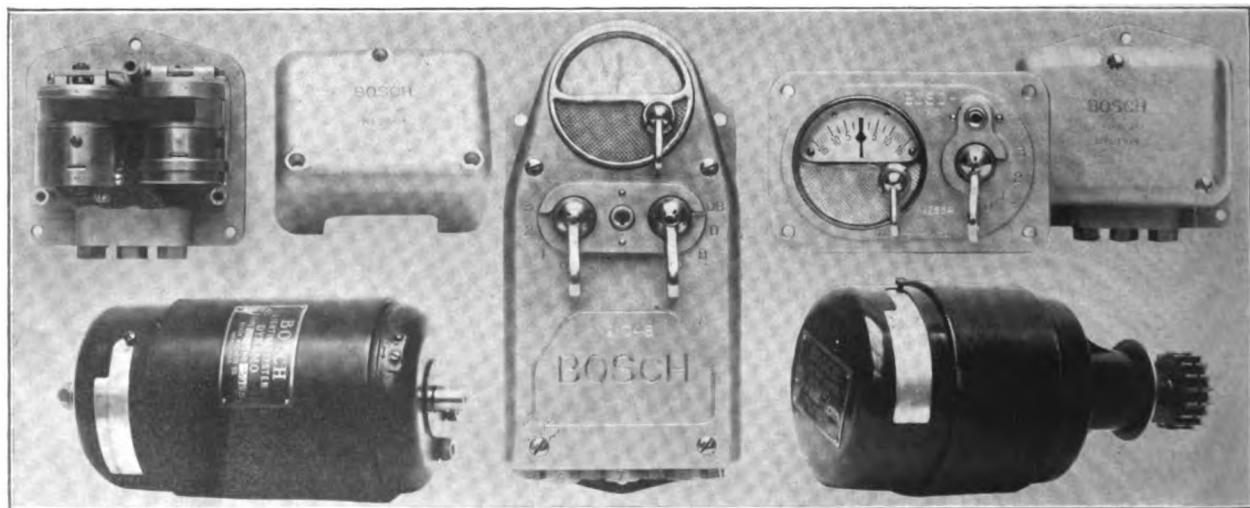
The motors, generators and accessories of the Rushmore system are well known and will be continued under the name of Bosch-Rushmore. The line includes three dynamos of different size, all wound for six volts; four starting motors wound for six volts, and three starting motors wound for 12 volts.

An interesting type of starter switch is utilized with the Bosch design, one eliminating long leads, devices in the circuit, etc. In the Bosch system the switch proper and its operating device are separated. The switch is actuated magnetically and is attached directly to the starting motor. The energizing of the switch magnet is by a pilot switch, composed chiefly of a plunger through the dashboard, which is pressed by the driver. Closing the pilot switch energizes the switch magnet, admitting current to the motor starter. This eliminates the necessity of resistance in the circuit.

The Bosch Magneto Company is marketing a safety device which automatically retards the spark in case the driver cranks the motor by hand. This device, which is shown in the group of motor starters, is attached to the forward part of the engine and is so arranged that when the starting crank is introduced by the driver, he

The Bosch-Rushmore starting motors are simple four-pole machines of comparatively low speed, with forged steel electrically welded frames. The armature shaft carries a small pinion which meshes directly with a gear secured to the flywheel of the engine, obtaining a single reduction, one resulting in a high efficiency of transmission as well as a high starting speed. The driving pinion is meshed and unmeshed automatically by a patented end throw of the armature and spring. The device is particularly adapted for equipping used motor cars and it is easily installed.

A feature of the Bosch-Rushmore dynamo is the manner of controlling the charging current. Its principle involves the use of the high positive temperature and resistance coefficient of iron. Between the armature brushes of the dynamo and the battery is connected an iron wire resistor, the resistance of which increases very



Bosch Lighting Dynamos.—The Upper Left View Is the Control Box with Cover Removed; the Centre Is the Bosch Combination Switch and Control Box for Standard Dashboard; in the Centre Is the Lighting Switch and Control Unit for Cowl Dashboards.

rapidly when the current exceeds a certain value. The increase in voltage across the iron wire resistor is also used to produce a proportional decrease in the field excitation, so that the voltage of the generator remains nearly constant, independent of the speed at which it is driven by the engine.

In shunt with the iron wire resistor is a field coil, the electromotive force of which is in a direction to oppose that of the main field coil, which is connected directly across the terminals of the battery. The resistance of the field or "bucking" coil is considerably greater than that of the ballast resistor when the latter is cold, or slightly heated. When the ballast resistor becomes heated with current its increased resist-

ance forces the bulk of the current of the generator through the "bucking" coil, thus augmenting the counter excitation produced by the latter. As the strength of the magnetic field is due to the difference between the exciting effect of the main shunt field winding and the "bucking" coil, by suitably proportioning the latter and the ballast coil to the other elements, the variation in current may be as small as desired.

The Bosch Magneto Company is also marketing a battery ignition system, comprising a combined circuit breaker and high-tension distributor. The circuit breaker is practically the same as used in the magnetos constructed by this company, except that it is operated by an external, instead of an internal, cam.

ADVOCATES UNIFORM HIGHWAY LAWS.

WORKING in conjunction with the American Bar Association, the American Highway Association seeks to have old road laws repealed and uniform highway laws substituted. Some laws now in effect have been on statute books for more than 100 years and are obsolete as far as the motor car is concerned.

A committee, appointed by and serving the two associations, has prepared a complete literal compilation of the road laws relating to all forms of indebtedness, the use of convict labor, and various other subjects which have a bearing upon the administration of public roads. An index chart for these laws is now being prepared and as soon as completed the committees will determine upon the lines along which revision will be sought. The governors of the various states will then be asked to recommend to the legislators the appointment of special committees to confer with the committees of the American Highway Association and the American Bar Association, with a view to adequate revision of the existing road laws.

The first step in the revision of the state road laws will be a recommendation by the committees that all obsolete, useless or unnecessary road laws be repealed. Then the work will consist merely of simplifying and arranging in logical order the existing necessary road laws. The committee has discovered a most hopeless confusion existing in states where accumulations of laws in some instances more than 100 years old are still in force to a certain extent.

Wherever practicable, uniform road laws for the various states will be urged by the committees, as it is realized that traffic is now controlled

by economic conditions rather than by state lines, and should not be hampered by conflicting laws of the various communities.

Certain basic principles of good administration will be urged by the joint committees, such as the payment of road taxes in cash, the elimination of a multitude of unnecessary road officials now characteristic of many states, the requirement of skilled supervision in the actual construction and maintenance of roads and providing qualification tests, the constant employment of highway engineers or superintendents, the adoption of the appointive rather than the elective method of creating such officials, the substitution of continuous maintenance for the present intermittent method, the proper utilization of convict labor where climatic and other conditions warrant its use on public roads for the preparation of road materials, the general adoption of the principle of state aid and supervision and the proper safeguarding and accounting of road funds.

The joint committees are expected to make their report at the fourth American road congress, which will be held at Atlanta, Ga., November 9-14, 1914.

RECOMMENDS UNIFORM LAWS.

Representing eight states, an interstate automobile vehicle law commission recently adopted a report recommending uniform laws for the States of New York, New Jersey, Pennsylvania, Maine, Maryland, Massachusetts, Connecticut and Delaware. The speed limit approved by the draft adopted is 24 miles per hour.

MECHANICAL NOTES FOR OWNERS.

THE owner who cares for his machine is frequently called upon to exercise considerable ingenuity in repairing or replacing a damaged

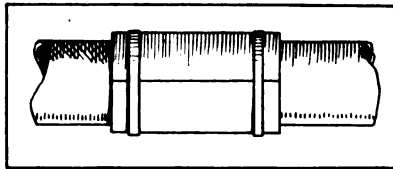


Fig. 1—Repair Made to Broken Exhaust Pipe.

component, especially if the car be an old model, one for which new parts cannot be obtained. An instance of a simple repair

to a broken exhaust pipe was noted recently by the writer.

The machine was used over rough roads and the pipe snapped because the muffler support broke, allowing the tubing to come into contact with a cross member of the frame. As a new part could not be obtained, and the motorist did not care to go to the expense of purchasing and fitting a new pipe, a repair was completed in the following manner:

A piece of tubing, about five inches long and slightly larger in diameter than that of the exhaust member, was secured, and a slot cut as shown at Fig. 1. This reduced the diameter sufficiently to make a tight fit. It was an easy matter to slip the new piece over the broken ends of the old tubing, and to secure it with clamps as shown. Leakage of the burned gases is so slight as not to be noticeable, and although the car has been in service for some time since the repair was made, the part appears to be as strong as it was originally.

UNUSUAL PUNCTURE.

When changing a punctured tube for a new one it is a good plan to make sure that the article causing the trouble is not in the casing. An instance is recorded of where a motorist made several changes of tubes in the same shoe before the trouble was located. A graphophone needle had been driven through the side of the tread in such manner that it was not discernible upon examination of the inside or exterior of the casing. The owner noted that each puncture was similar, occurring about a foot from the valve.

The leak was a slow one, as the puncture was very small. Upon arriving home the tire was subjected to a rigid inspection. By pressing hard with the finger in the neighborhood of the sus-

pected place, a sharp prick was experienced and the tip of the needle located. It required some ingenuity to dislodge it, the work being accomplished finally by a pair of round nosed, pointed, jewellers' pliers.

WEAK VALVE SPRINGS.

The missing of the motor at low speeds is generally caused by leakage of air in the intake pipe connections, valve guides, poor mixture, etc., but if, after making the usual tests, the trouble continues, it is suggested by the Willys-Overland Company, maker of the Overland cars, that the exhaust valve spring be examined to note if it has lost its tension.

If the spring be weak it will not seat the valve at low motor speeds, causing irregular operation, which is often ascribed to the troubles above mentioned. To test the action of the valve spring, insert the blade of a screw driver or similar shaped tool between the coils as shown at Fig. 2. This should be done with the motor running. If the missing stops it will indicate that the spring has lost its tension, and that either a new one is required or the old member needs stretching.

The reason for the missing of the cylinder, which has a weak exhaust spring, is that when the throttle is closed, the suction of the piston has a tendency to raise the valve from its seat, drawing in some of the exhaust gases. An imperfectly seated valve will present similar symptoms.

CARE OF GREASE CUPS.

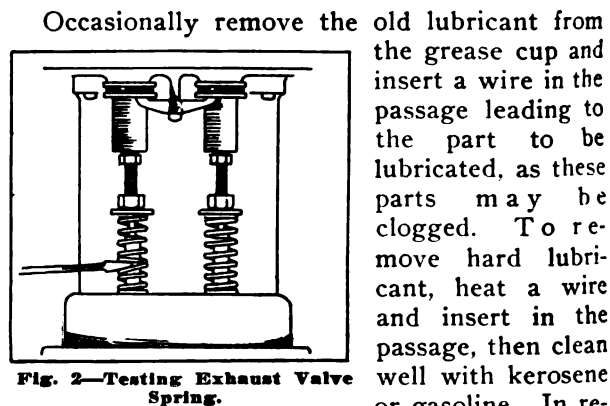


Fig. 2—Testing Exhaust Valve Spring.

Occasionally remove the old lubricant from the grease cup and insert a wire in the passage leading to the part to be lubricated, as these parts may be clogged. To remove hard lubricant, heat a wire and insert in the passage, then clean well with kerosene or gasoline. In renewing the supply of grease fill the cup about half full, then screw it down. Next refill the cup and replace it, and remove all surplus grease.

RECENT PATENTS.

Steering Gear, Walter F. Brown, Worcester, Mass.; No. 1,102,239. Filed Oct. 26, 1908.

Lubricating Device, Friedrich Greiner, Schwaebisch, Gmuend, Germany; assignor to Otto Schlick, Berlin, Germany; No. 1,102,263. Filed Aug. 15, 1913.

Shock Absorber, Allen E. Hall, Philadelphia, Penn.; No. 1,102,265. Filed June 24, 1913.

Valve, Paul Milburn, Spokane, Wash.; No. 1,102,283. Filed Oct. 11, 1912.

Auxiliary Air Valve, Ethan E. Sly, Norwalk, O.; No. 1,102,303. Filed Jan. 10, 1914.

Speed Indicator, Ernest William Cash, Hampton Wick, Eng.; No. 1,102,319. Filed Dec. 28, 1912.

Engine Starter, Clyde J. Coleman, New Rochelle, N. Y.; assignor to Conrad Hubert, New York, N. Y.; No. 1,102,322. Filed July 27, 1912.

Lubricator, Charles Thomas Gibney, Laporte, Ia.; No. 1,102,333. Filed Mar. 1, 1913.

Lubricating Packing, George Flawith, Melrose Highlands, Mass.; No. 1,102,332. Filed Dec. 23, 1912.

Gear Casing, Merrill L. Jenkins, Harvey, Ill.; assignor to Buda Company, Chicago, Ill.; No. 1,102,338. Filed Aug. 28, 1913.

Running Gear, Clifford W. Reynolds, Freeport, Ill.; No. 1,102,356. Filed Nov. 20, 1912.

Radiator, Frank Todd, Oak Park, Ill.; No. 1,102,366. Filed Oct. 14, 1911.

Wheel, William C. Hofen, San Francisco, Cal.; No. 1,102,406. Filed July 25, 1913.

Headlight, Bennie Isom, Concord, Neb.; No. 1,102,409. Filed May 20, 1913.

Grease Cup, Chester F. Johnson, Detroit, Mich.; No. 1,102,414. Filed Feb. 27, 1914.

Wheel, George T. McMillan, Bushnell, S. D.; No. 1,102,423. Filed July 17, 1913.

Bumper, Charles Setzler, Booneville, Ark.; No. 1,102,446. Filed March 25, 1912.

Wheel, Claude Sintz, Detroit, Mich.; No. 1,102,477. Filed Aug. 14, 1912.

Wheel, Marie Jean Francois Genillon, Lyons, France; No. 1,102,492. Filed Dec. 30, 1912.

Brake Torque Frame, William MacGlashan, South Bend, Ind.; assignor to the Studebaker Corporation; No. 1,102,529. Filed Feb. 26, 1913.

Signalling Device, Miller Reese Hutchison, New York, N. Y.; assignor to Lovell-McConnell Manufacturing Company, Newark, N. J.; No. 1,102,586. Filed June 7, 1910.

Motor, Marion M. Barnes, Lovilia, Ia.; No. 1,102,636. Filed April 11, 1913.

Shock Absorber, Raymond H. Carr and John N. Mad-dux, Kingman, Ariz.; No. 1,102,644. Filed Feb. 26, 1914.

Wheel, Frederick H. John, Middleport, Penn.; No. 1,102,665. Filed Feb. 3, 1913.

Tire, Isaac Morgan Sartain, Tracy City, Tenn.; No. 1,102,690. Filed Dec. 1, 1913.

Valve, Eugene Henri Tartrals, Montmorency, France; No. 1,102,817. Filed June 15, 1912.

Shock Absorber, Harrison Hurlbert Boyce, Oyster Bay, N. Y.; assignor to Edward V. Hartford, Deal, N. J.; No. 1,102,864. Filed Sept. 5, 1912.

Tire Repair Patch, Joshua H. Marvil, Laurel, Del.; No. 1,102,939. Filed Dec. 13, 1913.

Valve, Samuel Upton, Arlington Heights, Mass.; assignor to Simon P. McAskill, Cambridge, Mass.; No. 1,101,590. Filed Sept. 15, 1913.

Engine, Joseph Welsz, Colombes, near Paris, France; No. 1,101,599. Filed Sept. 5, 1912.

Radiator, Perry Ward Kempster, Prophetstown, Ill.; No. 1,101,634. Filed April 9, 1913.

Radius Rod, Herbert W. Alden, Detroit, Mich.; assignor to The Timken-Detroit Axle Company; No. 1,101,673. Filed May 21, 1913.

Running Gear, Herbert W. Alden, Detroit, Mich.; assignor to The Timken-Detroit Axle Company; No. 1,101,674. Filed June 14, 1913.

Shock Absorber, Allen Evert Hall, Philadelphia, Penn.; No. 1,101,696. Filed Oct. 7, 1913.

Unit Power Plant, Edward R. Hewitt, Ringwood, N. J.; No. 1,101,697. Filed Sept. 21, 1908.

Spring Tire, Henry M. Lakoff, Philadelphia, Penn.; No. 1,101,702. Filed Oct. 15, 1913.

Engine, William R. McKeen, Jr., Omaha, Neb.; assignor to McKeen Motor Car Company; No. 1,101,705. Filed June 12, 1907.

Tire Inflator, Niels A. Nielson, Marton, New Zealand; assignor of one-half to William Swainson Marshall, Mangaraupl, New Zealand; No. 1,101,708. Filed May 21, 1913.

Carburetor, Walter Gillett, Cleveland, O.; No. 1,101,736. Filed July 26, 1911.

Demountable Rim, Charles Gilbert Hawley and Earle King Baker, Chicago, Ill.; assignors to Universal Rim Company; No. 1,101,741. Filed June 10, 1909.

Radiator Protector, Frank H. Mason, Clarendon, Vt.; No. 1,101,751. Filed Feb. 24, 1912.

Top Raiser, James C. Moe, Palouse, Wash.; No. 1,101,755. Filed Feb. 11, 1913.

Wheel, William T. Dulany, Jr., Arlington, N. J.; No. 1,101,791. Filed Oct. 31, 1911.

Tire, George V. Baillard, New York, N. Y.; No. 1,101,828. Filed July 30, 1912.

Lamp, John U. Barr, New York, N. Y.; No. 1,101,829. Filed Oct. 9, 1912.

Self Starter, Paul T. Campbell, Greenwich, Conn.; No. 1,101,833. Filed April 3, 1913.

Drive Gear, Russell Huff, Detroit, Mich.; assignor to Packard Motor Car Company; No. 1,101,850. Filed Oct. 25, 1912.

Transmission, Charles B. King, Detroit, Mich.; assignor to King Motor Car Co.; No. 1,101,855. Filed July 21, 1910.

Hydraulic Steering, Charles M. Manly, New York, N. Y.; No. 1,101,864. Filed Oct. 4, 1908.

Resilient Wheel, Walter S. Rait, Chicago, Ill.; No. 1,101,881. Filed June 2, 1911.

Engine, Alexander Winton and Harold B. Anderson, Cleveland, O.; assignors to The Winton Motor Carriage Company; No. 1,101,895. Filed Jan. 24, 1908.

Top Folding Bow, Frank D. Campbell, Blockhouse, Wash.; No. 1,101,903. Filed Jan. 12, 1914.

Headlight, Peter J. Fay, Austin, Tex.; No. 1,101,912. Filed July 18, 1913.

COMING EVENTS.

July.

July 25-26—Grand Prix, Belgium.

August.

Aug. 16—International Light Car Race, Le Mans, France.

Aug. 17—Grand Prize de France, Le Mans, France.

Aug. 21-22—Road races, Elgin, Ill.

Aug. 23—Coupe de l'Auto Race, Auvergne, France.

Aug. 27—Race meet, Brooklands track, Weybridge, England.

September.

Sept. 5—Track races, Milwaukee, Wis.

Sept. 6-8—Newark, N. J., Cyclecar Reliability Tour to Atlantic City.

Sept. 7—Track races, Providence, R. I.

Sept. 7-14—Show, Indianapolis, Ind.

Sept. 9—Speedway races, Pomona, Cal.

Sept. 9—Road races, Corona, Cal.

Sept. 9—Grand Prix, Italy.

Sept. 14—Track meet, Milwaukee, Wis.

Sept. 15—Commercial Tercentenary Celebration New York City.

Sept. 26—Race meet, Brooklands track, Weybridge, England.

Sept. 26-Oct. 6—Show, Berlin, Germany.

October.

Oct. 2-3—Track meet, Oklahoma City, Okla.

Oct. 2-3—Track meet, Trenton, N. J.

Oct. 7-17—Electric Vehicle Show, New York City.

Oct. 9—Speedway races, Chicago, Ill.

Oct. 9-Nov. 2—European trip, Society of Automobile Engineers.

Oct. 16-26—Automobile Salon, Paris.

Oct. 17-24—Show, Pittsburg, Penn.

Oct. 19-21—Electrical Vehicle Association Convention, Philadelphia, Penn.

Oct. 19-26—American road congress, Atlanta, Ga.

November.

Nov. 6-16—Olympia show, London.

Nov. 8-9—Road Race, El Paso to Phoenix, Ariz.

Nov. 8-11—Track meet, Shreveport, La.

Nov. 15—Kerosene motor competition, Paris, France.

NEWS OF THE MANUFACTURER AND DEALER.

The following concerns have been incorporated recently to manufacture or deal in automobiles, accessories, etc.:

Greenleaf Manufacturing Company, Hartford, Conn.; \$35,000; W. H. Greenleaf, George J. Long, John R. Hayes. **W. R. Lantz Carriage & Automobile Company**, Muskogee, Okla.; \$25,000; W. R. Lantz, A. E. Lantz, J. O. Humphries.

Cyclops Cyclecar Company, Indianapolis, Ind.; \$10,000; to manufacture cyclecars; James W. Smith, C. A. Hargraves and others.

Excelsior Tire & Rubber Company, Wilmington, Del.; \$500,000; to manufacture automobiles and supplies.

Cook & MacConnell, New York City; \$1500; to deal in automobiles; John MacConnell, Eugene T. Scudder, Benjamin N. Scudder.

Comet Cyclecar Company, Indianapolis, Ind.; \$20,000; to manufacture cyclecars; F. P. Metz, L. F. Metz, W. H. Ogborn.

Crown Tire & Supply Company, Philadelphia, Penn.; to manufacture automobiles and accessories; J. M. Frere and others.

Savage Motor Car Company, Detroit, Mich.; \$10,000; to manufacture automobiles; Robert W. Fishback, Delbert H. Cummings, Alexander H. Fuss.

The Shurgas Manufacturing Company, Detroit, Mich.; \$15,000; to manufacture automobiles, carburetors and accessories.

Acme Automobile Company, New Orleans, La.; \$10,000; to engage in a general automobile business.

Simpson Garage, Esopus, N. Y.; \$1500; to conduct a garage; Herbert Cohen, Emil Adler, J. J. Curtin.

St. Mark's Garage, Brooklyn, N. Y.; \$10,000; to conduct a general garage and repair shop; D. Saladino, A. Quick, A. E. M. Quick.

Ponca City Garage, Ponca City, Okla.; \$10,000; to conduct a garage and repair shop.

Washington Garage, Chicago, Ill.; \$2500; to conduct a garage; Daniel Lynch, Della Lynch, John Divine.

The Auto Kraft & Garage Company, Detroit, Mich.; \$2000; to conduct a garage; A. C. Born, V. Oldberg, J. Palmer, Jr.

Archibale-Brouse-Parker Company, Cincinnati, O.; \$5000; to conduct a repair shop; Henry M. Brouse, W. H. Parker, R. J. H. Archibale, William B. Parker, Garritt J. Fredericks.

National Auto Repair Company, New York City; \$3000; to conduct a repair shop; Edward Grossman, Albert F. Tins, Walter Peppin.

Spencer Garage Company, Brooklyn, N. Y.; \$5000; to conduct a garage; J. O. Spencer, Jr., Anne E. Spencer, P. M. Weidmann.

The M. & M. Delivery & Garage Company, Buffalo, N. Y.; \$20,000; to conduct a general garage and delivery business; G. Roughhead, R. Macdonald, Maud Macdonald.

Float Jet Carburetor Company, Newark, N. J.; \$200,000; to manufacture carburetors for internal combustion engines; E. S. Smith, M. B. Smith, E. G. Gifford.

Bar-Bar Company, Grand Rapids, Mich.; \$15,000; to manufacture machinery and automobile novelties and specialties; Irving W. Barnhart, E. M. Barnes, R. R. Barnhart.

Canfield Gas Engine Company, Binghamton, N. Y.; \$50,000; A. Louis, W. J. Newing, E. L. Whitlock.

Swan Carburetor Company, San Francisco, Cal.; \$200,000; to manufacture carburetors; H. S. Hutchings, Ella M. Boynton, B. W. Dobbins.

Chicago Auto Radiator Manufacturing Company, Chicago, Ill.; \$1500; K. H. Emmerman, Louis Shaffer, Jacob Siegel.

Sloane-Daniel Motor Company, Bound Brook, N. J.; \$25,000; to manufacture engines, machinery, etc.; J. E. Sloane, C. Hogue, W. Phipps.

Stokes Carburetor Company, New York City; \$100,000; J. F. Smith, W. O. Stokes, T. M. Stokes.

Meder-Staudt Company, New York City; \$10,000; to manufacture and deal in storage batteries, motors, etc.; Philip F. Meder, Charles Meder, Charles Staudt, Katherine Staudt.

Harris Oil Engine Company, Bangor, Me.; \$200,000; to manufacture engines, etc.; H. L. Brown, DuPont Ammen, L. A. Hammersley.

J. & P. Sales Company, New York City; \$5000; to deal

in motors, etc.; Joseph J. Miller, Walter L. Perley, Grace Feeney.

NEW AGENCIES AND BRANCHES.

The Gross Hardware Company, Milwaukee, has been appointed sole agent for the Braender tire for the State of Wisconsin.

The Consumers' Tire Company, Milwaukee, has been appointed exclusive distributor for Acme tires and accessories. The company is located at Seventh and Wells streets.

The Down Town Garage Company, Detroit, is the name of a new concern which has opened for business at 30 Congress street, West.

The Republic Tire Company, Grand Rapids, Mich., has established a salesroom at 124 Division street. George E. Moran is in charge.

The Chalmers & Saxon Sales Company, Macon, Ga., is a new company which has started business in that city. The company has opened salesrooms in the Grand building. A service station has been established and all parts are carried.

The Lee Tire & Supply Company, Grand Rapids, Mich., is now handling the products of the Lee Tire & Rubber Company, Conshohocken, Penn. The company is located at 206 Ionia avenue.

E. Isenham, Indianapolis, has entered the trade as proprietor of the Indianapolis Auto Tire & Accessories Company. He is located at 1702 West North street. Until recently he was manager of the Marmon branch in that city.

The Bartles-Maguire Oil Company, Milwaukee, Wis., has been appointed distributor for the Knight tire.

GARAGE AND REPAIR SHOPS.

Martin Bros., Akron, N. Y., has opened a new garage.

The Wright Garage Company, Merrimac, Mass., has opened a first-class garage on Mill street.

J. B. Price, Quincy, Fla., has opened a new garage. It is modern throughout.

Andrew Stried, Brisswold, Ia., will open a garage and repair shop in the old Motor Inn building on Third street.

George E. Mickel, Walnut, Ia., has opened a new garage and repair shop. It is modern throughout.

Carver & Twyman Garage Company, Trenton, N. J., has opened an up-to-date garage.

Earl Winters, Hutchinson, Kan., has opened an up-to-date garage at 106 Sherman street.

G. E. Mosser, Batavia, Ia., has opened a new garage and repair shop which is modernly equipped.

The Stewart Garage Company, Muskegon, Mich., has opened a new garage which is modern throughout.

W. L. Forney, Chambersburg, Penn., who is owner of the Franklin Auto & Supply Company, has converted his large sale and exchange stable into a garage.

J. Heidelmayr & Son, College Point, N. Y., has opened a modern garage at 90 Jackson avenue. The garage is of fireproof construction.

Cedar & Russell, Santa Cruz, Cal., is the name of a new firm who will operate a first-class garage and repair shop. The company is located on Pacific avenue.

John W. Werts & Son, Shillington, Penn., has opened an automobile repair shop. The new company is located at Lancaster avenue.

The Ahwaga Garage Company, Owego, N. Y., has opened for business. The company has an up-to-date machine shop and repair department. The building is a new one.

Bennett & Fife, Oakland, Cal., has opened a machine shop on 12th street. The company is the local agent for Ford cars.

Rich & Sprague, Scranton, Penn., has opened a new garage at 638 Quincy street. It is modern throughout and the latest machinery has been installed.

The Marksheffel Automobile Company, Colorado Springs, Col., has opened a large garage at 22 North Cascade avenue. It was erected at a cost of \$50,000.

The Mohegan Garage, Lake Mohegan, N. Y., is the name of a garage which was recently opened. Dudley

F. Benton is the proprietor. He is agent for the Ford cars.

J. R. Borthwick, Pittsfield, Mass., formerly with the City Garage Company, has opened a garage and repair shop at 159 Union street.

The Central Garage, Detroit, has been opened in the former Pingree building at Jefferson avenue and Shelby street.

WITH THE MANUFACTURERS.

The Buick Motor Company, Flint, Mich., is erecting a three-story fireproof building for its enamel plant. The structure will be 108 by 265 feet and according to Buick officials it will be one of the most complete factory buildings in the world. In addition to the standard equipment of the modern enameling plant, in the Buick building will be installed the mono-rail system for moving the raw material and the finished product to the various parts of the factory. There will be 15 ovens and two high-speed electric elevators of 4000 pounds capacity each. There will be washed-air ventilation, dustless floors, ice-cooled drinking fountains of running water, well-lighted and sanitary lunch and locker rooms and shower baths for employees.

The Splittdorf Electrical Company, Newark, N. J., maker of the Splittdorf and Apple electrical equipment lines for motor vehicles, has established branches at Minneapolis and Dallas.

The Paige-Detroit Motor Car Company, Detroit, has opened a branch at Birmingham, Ala., in charge of John H. Campbell.

The Cole Motor Car Company, Indianapolis, has added a little six-model which resembles the larger six very closely and sells for \$1865.

The Peerless Motor Car Company, Cleveland, announces a line of four-wheel tractors, to be used for hauling trailers. One type hauls the trailers behind as with the standard truck. Another type carries one end of the trailer upon the tractor chassis.

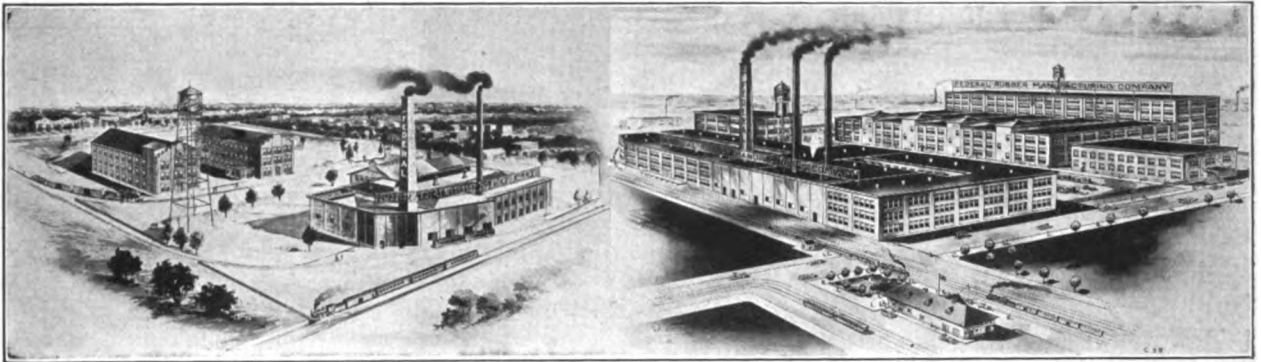
The Schiedel-Thompson Manufacturing Company, Indianapolis, has changed its name to the Metal Auto Parts Company. The company intends to enlarge its plant. The management and stockholders remain the same as in the past.

The Four Wheel Drive Auto Company, Clintonville, Wis., held its annual meeting recently. The articles of incorporation were amended, increasing the Board of Directors from seven to nine members, and A. W. Priest and A. Kuckuk were elected as directors. The company expended about \$500,000 in the past year for improvements to its factory and also machinery. A dividend of four per cent. on all stock outstanding on June 30, 1914, was declared and paid in cash. The sales for the past year for Four Wheel Drive trucks showed an increase of 165 per cent. over the preceding year.

The Kearns Motor Truck Company, Beavertown, Penn., has acquired 25,000 square feet of additional floor space which will be used for the building of a small car known as the Lulu.

The Buckeye Machine Company, South Lima, O., is erecting a new factory between Atlantic avenue and Broadway. The main building will be of brick. The company manufactures gas engines.

The Pullman Motor Car Company, York, Penn., has



Federal Rubber Manfg. Company's Present Plant at the Left; at Right, a Sketch of the Projected New Plant.

The Dallas Body & Wheel Works Company, Fort Worth, Tex., is establishing a large plant at 23 Commerce street for the manufacture of automobile bodies, wheels, etc. Another plant will be operated at Dallas.

The Federal Rubber Manufacturing Company, Milwaukee, Wis., celebrated its third anniversary on July 1 by the issuance of orders for the erection of new factory buildings costing more than \$500,000. These will consist of a separate building 60 by 497 feet with six stories and basement and additions to four of the present buildings, all 50 by 500 feet and five stories high. Brick mill construction will be used throughout. When completed the new buildings will mean an increase of 150,000 square feet, making 450,000 square feet in the entire factory. At the present time the number of men employed on night work equals the number on the day shift. Three years ago the Federal Rubber Company employed about 30 men, and today the company employs over 1500 men.

The Pacific Rubber & Tire Manufacturing Company, Seattle, Wash., has established a large plant in that city.

E. L. Carmody, Pittsburg, Penn., of the Motormeter Company, has announced that headquarters have been located at Baum boulevard. The company manufactures a device for automobiles to warn the drivers of any derangement in the cooling system.

The Hendee Manufacturing Company, Springfield, Mass., maker of the Indian motorcycle, has opened a branch and service station at 501 South Sixth street, Minneapolis.

The Nurdyke & Marmon Company, Indianapolis, Ind., has removed its Chicago branch to 2430 Michigan avenue.

under consideration plans for a big expansion of operations at its factory. The company is to build for the LaVigne Motor Company of Detroit. Representatives of the latter company and a committee of creditors of the Pullman company who were appointed recently to supervise the work at the York factory, will shortly decide on a definite contract and the work for building the cars will begin.

The Reo Motor Car Company, Lansing, Mich., will erect a large addition to its plant. The new buildings will represent an increase of about 30 per cent. of the present capacity and will be located on South Washington avenue. The company plans to build 12,000 for the 1915 season.

The Maxwell Motor Company, Detroit, entertained about 100 of its dealers from Indiana recently. They were taken to the Tuller hotel where arrangements had been made for them. After a visit to the Maxwell plants a tour of the city was made and the Hoosiers were afterwards entertained at luncheon at the Detroit Motor Boat Club. In the evening the visiting Maxwell dealers were the guests of the company at a theatre party. The dealers returned home in new Maxwell 25's.

The Willys-Overland Company, Toledo, O., has for several months past been making extensive additions to its plant. A number of large buildings is being added. One of them will be 410 by 500 feet and will have four stories and basement. Another will be an immense body plant which will be 200 by 410 feet, including two stories and basement. The power building is 162 by 134 feet and built of brick containing four 500-horsepower McNaul water tube boilers.

EXPORTS AND IMPORTS.

Foreign Trade Increases \$1,326,000, But Buying Abroad Shrinks 1,000,000.

Exports of American automobiles and parts for the eleven months ended May 31, 1914, totaled \$35,070,272, an increase of \$1,326,000 over the corresponding period of 1913, and an increase of \$8,829,000 over 1912.



Bosch Magneto Cup for National Amateur Motorcycle Championship of 1914.

During the same period of the fiscal year the automobile imports were \$1,504,091, a decrease of \$1,000,000 compared with 1912-13. The number of complete cars and chassis imported has fallen from 921 in 1911-12 to 278 in 1913-14, but imports of parts has nearly trebled, the figure increasing from \$283,736 to \$715,344.

For the same eleven months the exports of automobiles amounted to \$24,583,435; of en-

gines, \$1,284,484; of tires, \$3,052,089, and of other parts, \$6,150,864, giving a total of \$35,070,272. For the previous year the figures were: Automobiles, \$23,821,782; engines, \$1,719,493; tires, \$3,512,095, and other parts, \$4,690,983, making a total of \$33,744,353.

SUBSTITUTE FOR GASOLENE.

Officials connected with the automobile industry are watching with keen interest the outcome of a series of tests of a substitute for gasoline now being made at the Indianapolis Speedway. The new product is the invention of a Portuguese named John Andrews, who is securing patents on his mixture. Under the observance of speedway and national factory officials he produced by distillation from water with the addition of a small amount of chemicals, a mixture that exploded fully as well as gasoline. It is claimed that the mixture can be made to sell for five or six cents a gallon.

TO ATTACH WARRANTY'S TO CARS.

As many dealers neglect to notify the makers of cars of the names and addresses of new owners, a copy of the N. A. C. C. standard pleasure car warranty is posted on every new car by one member of the National Automobile Chamber of Commerce to insure purchasers of their warranty. This method advises owners of their rights to demand the replacement of defective parts and the making good of defective workmanship without cost any time within 90 days.

LINCOLN HIGHWAY BOOKLET.

F. H. Trego, chief engineer of the Lincoln Highway Association, Detroit, Mich., has compiled a booklet which has been published by the Goodyear Tire & Rubber Company, containing maps and information for those who may travel by the Lincoln Highway. This book discusses routes, costs, time, equipment, provisions, and gives a set of valuable "Don'ts."

LOUISVILLE AUTOMOBILE SHOW.

The first annual midsummer automobile show held at Louisville, Ky., was attended by 15,000 persons. The show was under the auspices of the Louisville Automobile Club. All dealers present were optimistic, saying that business is much better this year than it was in 1913.

WANTS GENERAL LICENSING.**Suggestion How \$130,000,000 a Year Could Be Raised for Highway Work.**

If the continually growing sentiment in favor of a fair and general taxation by licensing all highway users in America could be practically realized, funds totalling \$130,000,000 could be raised for the construction and maintenance of highways, according to the National Automobile Chamber of Commerce. The licensing, this body maintains, could best be done by the several states on the basis of the use of the roads by the different classes of vehicles. Thus, licensing automobiles from \$10 to \$25, the 1,385,000 cars now in operation would pay a total of about \$19,000,000; 14,600,000 horse-drawn vehicles would, if licensed from \$5 to \$20, produce about \$108,000,000, while motorcycles and bicycles would pay \$3 and \$1, respectively, and aggregate \$3,400,000. The grand total of \$130,000,000 is almost equal to the total available highway funds provided by United States counties, districts and townships.

THE ART OF TESTING CARS.

One must be extra particular in selecting a motor car when the selecting means merely that and no more. To be more explicit, a clean-cut brisk young man, according to San Francisco despatches, was recently observed in that city to stop before a \$5,000 car standing on the street, and after looking it over critically for a few moments, climbed in and started the motor. He then got out of the machine and listened intently to the hum of the engine for a little while, and seeming perfectly satisfied, shut off

the power and passed on to another car.

After repeating this performance several times more he was quizzed by a watchman, but the young man, handing the watchman a cigar, explained that he was merely "testing" the motors. Having thoroughly "tested" an Oakland and apparently finding it to his liking he drove off, still "testing." The car was recovered several days later, but the young man is still at large, and will undoubtedly continue his testing abilities on a larger scale in the future.

FORD BUYS BROOKLYN LAND.

The Ford Motor Car Company of Detroit has purchased a plot at the northwest corner of Sterling place and Bedford avenue, Brooklyn, N. Y., 44 by 100 feet, but use to be made of this land has not been announced.

R. W. MACY CEASES ACTIVE WORK.

R. Ward Macey, Jr., has resigned his position of sales manager of the Premier Motor Manufacturing Company, Indianapolis, but remains a stockholder of the corporation. Before becoming connected with this company he was affiliated first with the Ford and later with the Franklin interests.

NEW STUDEBAKER PLANT.

Studebaker Corporation has added to its string of Detroit, Mich., plants the large structure formerly occupied by the American Harrow Company. This will now be known as Plant 2, and will be used as a parts repository and receiving station.



North Street and Delaware Avenue

"STOP AT HOTEL LENOX"

Buffalo, N. Y.

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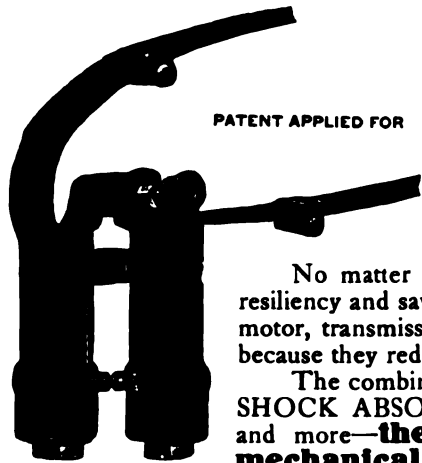
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For thirty days you can try them at our expense.

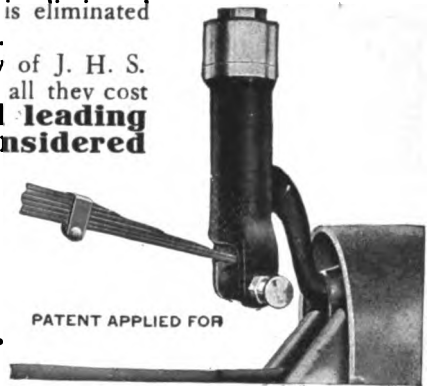
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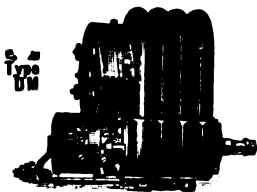
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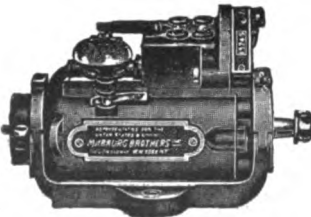
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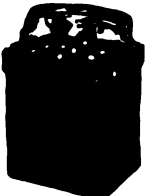


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Times Building, Pawtucket, R. I.

Classified Buyers' Guide

A Handy Reference for Purchasers

ACCESSORY MANUFACTURERS AND JOBBERS.

Alsten & Goulding Co., 36 Foster St., Worcester, Mass.
Auto Parts Co., Providence, R. I.
Bi-Motor Equipment Co., 180-182 Massachusetts Ave., Boston.
Danver Accessory Co., 18 Broadway, Pawtucket, R. I. (Daco.)
Milwaukee Auto Specialty Co., 705-711 Chestnut St., Milwaukee, Wis.
Motor Parts Co., 185-187 Columbus Ave., Boston; 818 No. Broad St., Philadelphia; Springfield, Mass.
Northwestern Chemical Co., Marietta, O.
Times Square Auto Co., 56th St., at Broadway, New York City.
Waite Auto Supply Co., 81 Exchange place, Providence.

ACETYLENE TANKS. (See Tanks.)

AIR COMPRESSORS AND TANKS.

Brunner Mfg. Co., Main Office and Factory, Utica, N. Y.; New York Office, Hudson Terminal Bldg., 30 Church St. (Brunner.)
Williams Foundry & Machine Co., Akron, O.

AMMETERS AND VOLTMETERS.

Hoyt Electrical Instrument Works, Penacook, N. H.

AUTOMOBILES. (See Cars.)

AUTOMOBILE SPECIALTIES.

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y. (Brass Goods.)

BALLS AND BALL BEARINGS.

Ahlberg Bearing Co., 2624 Michigan Ave., Chicago; 1786 Broadway, New York City; 805 Woodward ave., Detroit.
Boyd, F. Shirley, 903 Boylston St., Boston. (R. I. V.)
Marburg Bros., Inc., 1790 Broadway, New York. (S. R. O.)
New Departure Mfg. Co., Bristol, Conn.
Norma Co. of America, 1790 Broadway, New York City. (Norma.)
R. I. V. Co., 1771 Broadway, New York. (R. I. V.)

BATTERIES.

Edison Storage Battery Co., 137 Lakeside Ave., Orange, N. J. (Edison.)
Geiszler Bros. Storage Battery Co., 514 W. 57th St., New York.
Waite Auto Supply Co., 81 Exchange place, Providence. (Success.)

BODIES—WOOD AND METAL.

Springfield Metal Body Co., 20 Medford Ave., Springfield, Mass.

BRAKE BANDING OR LINING.

Royal Equipment Co., 1378 Bostwick Ave., Bridgeport, Conn.
Russell Mfg. Co., Middletown, Conn. (Rusco.)
Standard Woven Fabric Co., Framingham, Mass. (Multibestos.)
Branches: F. Shirley Boyd, 903 Boylston St., Boston; C. D. Schmidt, 276 Canal St., New York City; N. A. Petry Co., 1427 Vine St., Philadelphia; F. E. Sparks, 1430 Michigan Blvd., Chicago; Fred Ward & Son, San Francisco.
Thermoid Rubber Co., Trenton, N. J. (Thermoid Hydraulic Compressed.)

BRUSHES, WIRE.

Williams Foundry & Machine Co., Akron, O.

(Continued on Page 74.)

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WHY?



Because—regardless of the heat, the speed, or the hard service of your car—this effective lubricant maintains a protective film between ALL bearing surfaces. It does not wear out or waste away like ordinary oils or greases. Furthermore, wear and tear is greatly reduced and power losses minimized.

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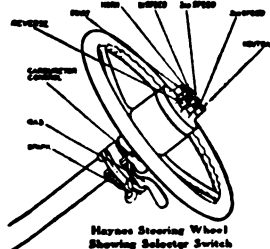
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 SIMPLE—STAUNCH—TRUE
A Car Full of Hill Climbing Ability
 Interesting Facts About the Gearless Transmission
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LANSING

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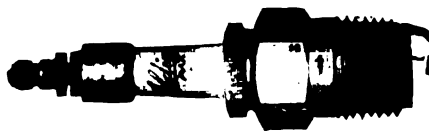
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Sager Co., J. H., 271 South Ave., Rochester, N. Y. (Diamond.)

CARBON REMOVERS. (See Cylinder Cleaning Compound.)

CARBURETORS.

Findelsen & Kropf Mfg. Co., 2127 Rockwell St., Chicago. (Rayfield.)
Branches: 1140 Michigan Ave., Chicago; 1211 Woodward Ave., Detroit; 1902 Broadway, New York City.
Zenith Carburetor Co., Detroit. (Zenith.)

CARS—ELECTRIC PLEASURE.

Baker Motor Vehicle Co., Cleveland. (Baker.)

CARS—GASOLINE PLEASURE.

Cartercar Co., Pontiac, Mich. (Cartercar.)
Cole Motor Car Co., Indianapolis, Ind. (Cole.)
Empire Automobile Co., Indianapolis, Ind. (Empire, Little Aristocrat.)
Haynes Automobile Co., 166 Main St., Kokomo, Ind. (Haynes.)
Knox Motors Co., Springfield, Mass. (Knox.)
Lexington-Howard Co., Connersville, Ind. (Lexington and Howard.)
Maxwell Motor Co., Inc., Detroit. (Maxwell.)
Mets Company, Waltham, Mass. (Mets.)
Moline Automobile Co., E. Moline, Ill. (Moline.)
National Motor Vehicle Co., 1033 22nd St., Indianapolis. (National.)
Nordyke & Marmon Co., Indianapolis. (Marmon.)
Paige-Detroit Motor Car Co., Detroit. (Paige.)
Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)
Premier Motor Mfg. Co., Indianapolis, Ind. (Premier.)
Reo Motor Car Co., Lansing, Mich. (Reo.)
Salvador Motor Co., Farragut Bldg., Massachusetts Ave., Boston. (Salvador.)
Studebaker Corp., Detroit. (Studebaker.)
Stutz Motor Car Co., Indianapolis. (Stutz.)
Velle Motor Vehicle Co., Moline, Ill. (Velle.)
Willys-Overland Co., Toledo, O. (Overland.)
Winton Motor Car Co., 131 Berea Road, Cleveland, O. (Winton.)

CARS—GASOLINE COMMERCIAL.

Adams Bros. Co., Findlay, O. (Adams.)
Alma Motor Truck Co., Detroit. (Republic.)
Factory: Alma, Mich.
Bessemer Motor Truck Co., Grove City, Penn. (Bessemer.)
Cartercar Co., Pontiac, Mich. (Cartercar.)
Dart Manufacturing Co., Waterloo, Ia. (Dart.)
Driggs-Seabury Ordnance Corp., Sharon, Penn. (Vulcan.)
Federal Motor Truck Co., Junction and Leavitt Sts., Detroit. (Federal.)
General Motors Truck Co., 26 Cadillac Ave., Pontiac, Mich. (GMC.)
Branches: New York, Chicago, Boston, Philadelphia, Kansas City.
Gramm-Bernstein Co., Lima, O. (B. A. Gramm's.)
Knox Motors Co., Springfield, Mass. (Knox and Martin Tractor.)
MotorKart Co., 1790 Broadway, New York City. (MotorKart.)
Factories: Peekskill and Tarrytown, N. Y.
Palmer-Moore Co., Syracuse, N. Y. (Palmer-Moore.)
Pierce-Arrow Motor Car Co., Buffalo, N. Y. (Pierce-Arrow.)
Reo Motor Car Co., Lansing, Mich. (Reo.)
Signal Motor Truck Co., Detroit. (Signal.)
Studebaker Corp., Detroit. (Studebaker.)
Sullivan Motor Car Co., Rochester, N. Y. (Sullivan.)
Velle Motor Vehicle Co., Moline, Ill. (Velle.)
Willys-Overland Co., Toledo, O. (Willys Utility and Garford.)

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More Power
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Four-cylinder,
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(BUYERS' GUIDE—Continued.)

CARS—ELECTRIC COMMERCIAL.

Baker Motor Vehicle Co., Cleveland, (Baker.)
 Couple-Gear Freight-Wheel Co., 575 Buchanan St.,
 Grand Rapids, Mich. (Couple-Gear.)
 Branches: 30th floor, Singer Bldg., New York; 178
 Devonshire St., Boston.
 General Motors Truck Co., 26 Cadillac Ave., Pontiac,
 Mich. (GMC.)
 Branches: See Cars—Gasoline Commercial.
 General Vehicle Co., Long Island City, N. Y. (G. V.)

CARS—FIRE, POLICE AND MUNICIPAL SERVICE.

Cartercar Co., Pontiac, Mich. (Cartercar.)
 Couple-Gear Freight-Wheel Co., 575 Buchanan St., Grand
 Rapids, Mich. (Couple-Gear.)
 Branches: See Cars—Electric Commercial.
 Knox Motors Co., Springfield, Mass. (Knox and Martin
 Tractor.)
 Willlys-Overland Co., Toledo, O. (Overland.)

CEMENTS.

Northwestern Chemical Co., Marietta, O. (Se-ment-ol Ra-
 diator.)
 Rub-On Mfg. Co., 87-97 Brayton St., Buffalo, N. Y. (Sta-
 Fix Radiator Mend.)

CHAIN LUBRICANTS.

Motor Accessories, Inc., 749 A Boylston St., Boston.
 (Chain-Lub.)

CHAINS, TIRE, AND ANTI-SKIDDING DEVICES.

Weed Chain Tire Grip Co., 28 Moore St., New York.

CHAINS—TRANSMISSION OR DRIVING.

Boyd, F. Shirley, 903 Boylston St., Boston. (Baldwin.)

COILS.

Helme Electric Co., Lowell, Mass.

CYLINDER CLEANING COMPOUND.

Bowling Green Sales Co., 80 Flatbush Ave., Brooklyn, N.
 Y. (Ball Carbon Remover.)
 Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.
 Milwaukee Auto Specialty Co., 705-711 Chestnut St., Mil-
 waukee.
 Northwestern Chemical Co., Marietta, O. (Carbonox.)
 Prest-O-Lite Company, 226 Speedway, Indianapolis.
 (Prest-O-Carbon Remover.)
 Branches: Atlanta, Baltimore, Boston, Buffalo, Chica-
 go, Cincinnati, Cleveland, Dallas, Denver, Detroit, In-
 dianapolis, Jacksonville, Kansas City, Los Angeles,
 Milwaukee, Minneapolis, New York, Omaha, Philadel-
 phia, Pittsburg, Providence, San Francisco, Seattle, St.
 Louis and St. Paul.

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Rub-On Mfg. Co., 87-97 Brayton St., Buffalo, N. Y.

ELECTRIC LIGHTING EQUIPMENT.

Culver-Stearns Mfg. Co., Worcester, Mass.; Detroit.

FAN BELTS.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

FIRE EXTINGUISHERS.

Northwestern Chemical Co., Marietta, O. (Fire-Fly.)

FORD AUTOMOBILE EQUIPMENT.

Danver Accessory Co., 18 Broadway, Pawtucket, R. I.
 (Daco.)
 Russell Mfg. Co., Middletown, Conn.

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The Bosch Magneto is the Quality Ignition System

That fact has long been established, not
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To permit your car to have any other ig-
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 199 Service Stations in U. S.
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Are of the highest quality and the cheapest on
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Plugs
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BRAKE LINING

The Ideal Brake Lining for All Types of Motor Vehicles. It Is Sold with the Fullest Guarantee for Quality, Service and Satisfaction.

Innumerable Tests Have Proven Its High Resistance to Wear and Its Efficiency for Braking. Heat-Resisting, Slow Wearing, Shock-Reducing and Safety Insuring. It has No Equal.

Made in All Sizes to 9 Inches Width and ½-Inch Thickness.

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MOTOR CARS

Send for Pleasure or Commercial Catalogue.
KNOX MOTORS CO., SPRINGFIELD, MASS.

METZ "22" ROADSTER \$495

Fore door body, extra thick tufted upholstery, plate glass rain-vision windshield, left-hand drive with center control, gearless transmission, 4-cylinder, 22½ H. P. water-cooled motor, Bosch magneto, Prest-O-Lite tank, extension top, artillery wheels, best quality Goodrich clincher tires, 5 lamps, horn, pump, tools, etc. Secure EXCLUSIVE SALE in your territory. Write for terms and catalog "Q."

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Manufacturers and Jobbers

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(BUYERS' GUIDE—Continued.)

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Dover Stamping & Manufacturing Co., Cambridge, Mass. (Dover.)

GASKETS AND GASKET CUTTERS.

Shawver Co., Springfield, O.

GEARS, STEERING.

Ross Gear & Tool Co., 794 Heath St., Lafayette, Ind.

GUNS, GREASE. (See Pumps, Oil and Grease.)

HORNS.

Bonner, D. Henry, Co., Cambridge, Mass. (Tremo.)
Garford Mfg. Co., Elyria, O. (Tuto.)

JACKS, ETC.

Shawver Co., Springfield, O.

LAMPS, TAIL. (See Tail Lights.)

LEATHER GOODS.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

LIGHTING SYSTEMS, ELECTRIC.

Garford Mfg. Co., Elyria, O. (Dynalux.)

LUBRICANTS.

Alsten & Goulding Co., 36 Foster St., Worcester, Mass. (Alding.)

Continental Asbestos Corporation, Worcester, Mass. (Spedolene.)

Dixon Crucible Co., Jos., Jersey City, N. J. (Graphite.)

Eagle Oil & Supply Co., 104 Broad St., Boston. (Eagle-line No-Karbon.)

Haws, Geo. A., 148 Front St., New York. (Panhard.)
Branch: 899 Boylston St., Boston.

Indian Refining Co., 17 Battery Place, New York City. (Havoline.)

New York & New Jersey Lubricant Co., 165 Broadway, New York. (MoToRol, Non-Fluid, Kejex.)

Northwestern Chemical Co., Marietta, O. (Gear-Silence.)

Platt & Washburn Refining Co., 7 Broadway, New York City. (Veedol.)

Standard Oil Co., New York. (Polarine.)
Branches: In all cities.

Vacuum Oil Co., Rochester, N. Y. (Gargoyle Mobiloils.)
Branches: 49 Federal St., Boston; 61 Broadway, New York; Fourth and Chestnut Sts., Philadelphia; 154 Exchange St., Bangor, Me.; 406 Hitchcock Bldg., Springfield, Mass.; 117 Commercial St., Portland, Me.; Fisher Bldg., Chicago; 321 Free Press Bldg., Detroit; Indiana Pythian Bldg., Indianapolis.

Valvoline Oil Co., 27 State St., Boston. (Valvoline.)

MAGNETO COVERS.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

MAGNETOS AND SUPPLIES.

Bosch Magneto Co., 223-225 W. 46th St., New York.

Branches: 119-121 E. 24th St., Chicago; 1250 Woodward Ave., Detroit; 357 Van Ness Ave., San Francisco.

Elsemann Magneto Co., 32 33rd St., Brooklyn, N. Y. (Elsemann.)

Branches: 123 W. 52d St., New York City; 514 No. Capitol Ave., Indianapolis; 802 Woodward Ave., Detroit.

Heinze Electric Co., Lowell, Mass. (Heco.)

Holtzer-Cabot Co., Brookline, Mass.

(Continued on Next Page.)

(BUYERS' GUIDE—Continued.)

Branches: 101 Park Ave., New York City; 6161-65 So. State St., Chicago; 1005 Union Trust Bldg., Baltimore.
 Marburg Bros., 1790 Broadway, New York. (Mea.)
 Splidert Electrical Co., 98 Warren St., Newark, N. J.
 Branches: 10-20 W. 63rd St., New York; 1110 S. Michigan Ave., Chicago; 180-182 Massachusetts Ave., Boston; 1028 Geary St., San Francisco; 972 Woodward Ave., Detroit; 1228 S. Olive St., Los Angeles, Cal.; S. W. Corner Cherry and Juniper Sts., Philadelphia; 1822 Grand Ave., Kansas City; 1628 Broadway, Seattle, Wash.; London, Eng.; Buenos Aires.

MAILING LISTS.

Owners' Auto List Co., Albany, N. Y.

MASTER VIBRATORS.

New York Coil Co., 338 Pearl St., New York City.

MEASURES.

Dover Stamping & Manufacturing Co., Cambridge, Mass. (Auto and Savol.)

METERS, ETC.

Northwestern Chemical Co., Marietta, O. (Hydrometers and Thermometers.)

MOTOR STARTERS.

Automatic Appliance Co., 172 Columbus Ave., Boston. (Boston.)

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.

PAINT, ANTI-RUST.

Northwestern Chemical Co., Marietta, O. (Never-Rust.)

PATCHES, TIRE.

Braender Rubber & Tire Co., Rutherford, N. J. (Cementless.)

PISTON RINGS.

McQuay-Norris Mfg. Co., Dept. D, St. Louis, Mo. (Leak-Proof.)

POLISH.

International Metal Polish Co., Quill St. and Belt R. E., Indianapolis, Ind. (Blue Ribbon.)

Morgan Mfg. Co., Dept. F, Newport, R. I. (MorganBrita.)

Northwestern Chemical Co., Marietta, O.

Rub-On Mfg. Co., 87-97 Brayton St., Buffalo, N. Y.

PUBLICATIONS, AUTOMOBILE.

The Automobile Journal, 24 issues, \$1.00 the year.	
The Motor Truck (Commercial Car), Monthly, \$2.00 the year.	
The Accessory and Garage Journal, Monthly, \$2.00 the year.	
Motor Truck Construction, Operation, Care and Repair	\$1.00
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Overhauling, Rebuilding and Equipping the Motor Car50
Lighting the Motor Car by Electricity50
The A B C of Internal Combustion Engine Maintenance and Repair .....	.35
The A B C of Carburetor Construction, Maintenance and Repair .....	.35
The A B C of Magneto Systems .....	.35
The A B C of Battery Ignition Systems .....	.35
The Motorcycle, Maintenance, Repair and Construction35
The A B C of Motor Car Chassis Maintenance and Repair25

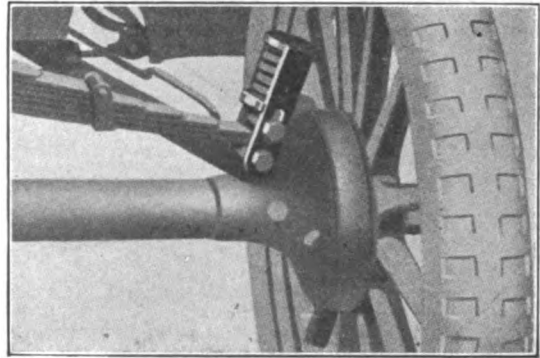
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The Wallace Shock Absorbers

take the place of the spring shackles and look like, nothing so much, as the LOGICAL SPRING HANGER.



THE WALLACE SHOCK ABSORBERS

lie in direct line with the path of shock impulse and move with it.

Even the slightest shock is transmitted directly to the spiral springs and no part of it is taken up by friction in other moving parts.

YOU WILL ATTACH **FORD**
THEM TO YOUR

BECAUSE—

you realize that the *right* shock absorber *must* be good for your car.

BECAUSE—

your own judgment tells you that the principle upon which the WALLACE is constructed *is right*.

BECAUSE—

the price, \$10, is a very reasonable sum to ask for that device which will give you more SOLID COMFORT than anything else you can put on your car.

**\$10 FULL SET
OF FOUR**

ORDER THROUGH YOUR DEALER OR DIRECT

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DETROIT, MICH.

From San Francisco, Cal., to Eastport, Me.

AMONG the adobe huts of New Mexico and the high hills of New Hampshire you will find motorists demanding

Polarine

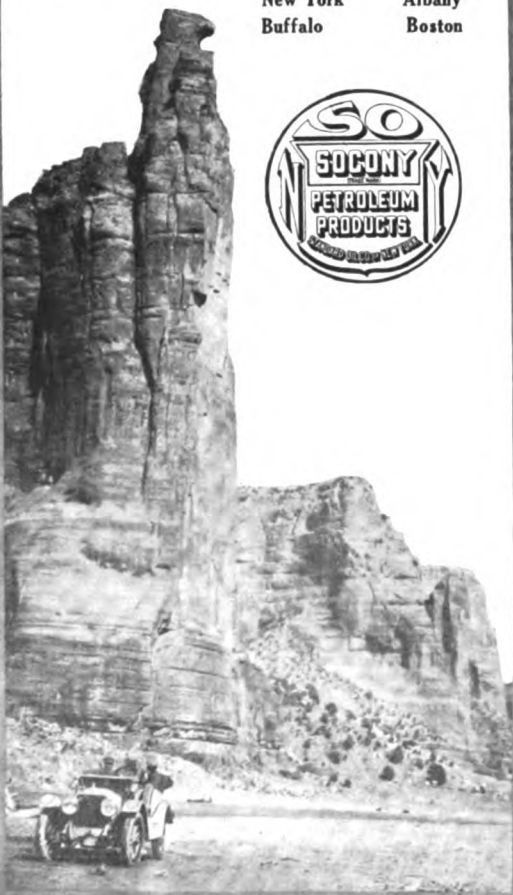
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Frost proof Carbon proof Heat proof

Socony Motor Gasoline is the best.

STANDARD OIL CO. OF NEW YORK

New York Albany
Buffalo Boston



(BUYERS' GUIDE—Continued.)

Maintenance and Repair of Motor Car Tires..... .35
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PUMPS, OIL AND GREASE.

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.
Green & Swett Co., 737 Boylston St., Boston. (Tri-Phoon Car and Garage.)

PUMPS, TIRE.

Cox Brass Mfg. Co., Dudley Ave., Albany, N. Y.
Shawver Co., Springfield, O.

RIMS—REMOVABLE AND DETACHABLE.

Boyd, F. Shirley, 903 Boylston St., Boston. (Dorian.)
United States Tire Co., Broadway and 58th St., New York. (Continental and Whittlesey Demountable.)
Branches: New York, Chicago, San Francisco.

RINGS. (See Piston Rings.)

ROAD BUILDING MATERIALS.

Barrett Manufacturing Co., New York. (Tarvia.)
Branches: Chicago, Philadelphia, Boston, St. Louis, Cleveland, Pittsburg, Cincinnati, Kansas City, Minneapolis, New Orleans, Birmingham, Ala.; Seattle, London, Eng.; Montreal, Toronto, Winnipeg, Vancouver, Can.; St. John, N. B.; Halifax, N. S.

ROLLER BEARINGS.

Hyatt Roller Bearing Co., Detroit. (Hyatt.)
Norma Co. of America, 1790 Broadway, New York City. (Norma.)

SEAT COVERS.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

SELF-STARTERS. (See Motor Starters.)

SHOCK ABSORBERS AND SUPPLEMENTARY SPRINGS.

Boyd, F. Shirley, 903 Boylston St., Boston.
Breslau Wallace Sales Co., 1031 Dime Bank Bldg., Detroit. (Wallace.)
Donnelly Motor Equipment Co., 1785 Broadway, New York City. (Ely.)
Perkins-Campbell Co., 622 Broadway, Cincinnati O.
Sager Co., J. H., 271 South Ave., Rochester, N. Y. (Peerless.)

SOAPS.

Colgate & Co., 199 Fulton St., New York City. (Moto-Gloss and Mechanics' Soap Paste.)
Northwestern Chemical Co., Marietta, O. (Dermalene.)

SPARK PLUG CASES.

Perkins-Campbell Co., 622 Broadway, Cincinnati, O.

SPARK PLUGS AND IGNITERS.

Alsten & Goulding Co., 36 Foster St., Worcester, Mass. (Alding.)
Bosch Magneto Co., 223-225 W. 46th St., New York.
Branches: See Magnetos and Magneto Supplies.
Heinze Electric Co., Lowell, Mass. (H. E. Co. Priming.)
Mosler, A. R., & Co., P. O. Box M, Mt. Vernon, N. Y. (Split-Fire.)
Silvex Company, The, 60 Wall St., New York City. (Bethlehem Five Point.)
Splitdorf Electrical Co., 98 Warren St., Newark, N. J.
Branches: See Magnetos and Magneto Supplies.

(Continued on Next Page.)

(BUYERS' GUIDE—Continued.)**SPEEDOMETERS, RECORDERS, ETC.**

Northwestern Chemical Co., Marietta, O. (Hydrometers and Thermometers.)

SPRINGS FOR AUTOMOBILE SUSPENSION.

Marburg Bros., Inc., 1790 Broadway, New York. (Marburg-Hagen.)

SPROCKETS.

Boyd, F. Shirley, 903 Boylston St., Boston. (Baldwin.)

STEEL, ETC.

Ward's Sons, E. T., 25 Purchase St., Boston, Mass. (Seamless.)

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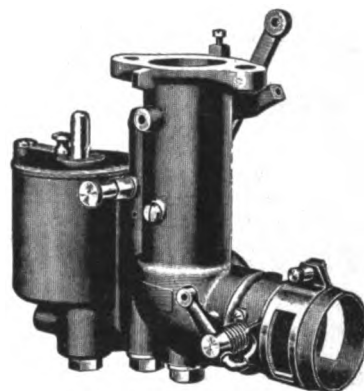
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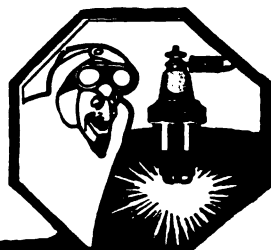
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